

Original Article:

Treating hirsutism in PCOS with combination of medical & laser therapy

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Abstract

Background: Hirsutism is one of the most distressing manifestations of polycystic ovary syndrome (PCOS), often leading to significant psychological burden. Conventional treatments such as shaving or waxing offer temporary relief. Myo-inositol and D-chiro-inositol have shown efficacy in addressing the hormonal and metabolic dysfunctions of PCOS, while laser hair removal offers long-term improvement. However, the combined effect of these therapies has not been well studied. **Aim of the study:** To evaluate the efficacy and safety of combining medical therapy (myo-inositol and D-chiro-inositol) with laser treatment in managing hirsutism among women with PCOS. **Methods:** This prospective case-control study was conducted from July 2023 to June 2024 in two tertiary care centers in Bangladesh. A total of 80 women aged 18–40 years with PCOS and hirsutism (Ferriman-Gallwey score ≥ 8) were enrolled and divided equally into an intervention group (medical therapy + laser treatment) and a control group (medical therapy only). **Result:** Both groups were comparable at baseline. The intervention group showed a significantly greater reduction in Ferriman-Gallwey scores at 6 months (mean reduction: 9.2 ± 2.7 vs. 3.5 ± 1.8 ; $p < 0.001$), with a large effect size ($d = 2.24$). Satisfaction scores were higher in the intervention group (overall satisfaction: 8.7 ± 1.1 vs. 6.1 ± 1.4 ; $p < 0.001$), and DLQI scores improved significantly (mean improvement: 8.6 ± 3.9 vs. 4.0 ± 2.7 ; $p < 0.01$). Mild, transient adverse events related to laser therapy occurred in 20% of patients but resolved without intervention. Multivariable regression confirmed that the combination treatment independently predicted greater improvement in hirsutism. **Conclusion:** Combining myo-inositol and D-chiro-inositol with laser therapy is a highly effective and well-tolerated treatment strategy for hirsutism in PCOS patients. It significantly enhances clinical, psychosocial, and patient-centered outcomes compared to medical therapy alone.

Keywords: Polycystic Ovary Syndrome (PCOS), D-chiro-inositol, Ferriman-Gallwey Score, Dermatology Life Quality Index (DLQI), Visual Analog Scale (VAS)

Introduction

Polycystic Ovary Syndrome (PCOS) is a complex hormonal disorder characterized by chronic anovulation, hyperandrogenism, and polycystic ovarian morphology^[1]. PCOS is one of the most prevalent endocrine disorders among women of reproductive age, affecting approximately 10% to 13% of women globally, according to the Global Burden of Disease Study 2017^[2]. In Bangladesh, the burden appears to be even higher, with hospital-based studies estimating a prevalence of 18% to 20%, particularly among urban populations, due to rising

obesity, sedentary lifestyles, and poor dietary habits^[3]. Among the various clinical manifestations of PCOS—including menstrual irregularities, infertility, insulin resistance, obesity, acne, and alopecia—hirsutism is among the most common and distressing cutaneous symptoms^[4]. Hirsutism refers to the presence of excessive, coarse, terminal hair in androgen-sensitive areas of the female body, such as the face, chest, back, and lower abdomen. It affects approximately 60% to 80% of women with PCOS and is a visible marker of underlying

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androgen excess^[5]. The psychological burden of hirsutism is substantial, often resulting in emotional distress, reduced quality of life, and social avoidance, particularly among adolescents and young women^[6]. The pathogenesis of hirsutism in PCOS primarily involves hyperandrogenism, caused by increased ovarian androgen production, dysregulated hypothalamic-pituitary-ovarian (HPO) axis, and peripheral insulin resistance^[7]. In some cases, idiopathic hirsutism may present without overt hormonal imbalance, but PCOS remains the leading endocrinological cause. Traditional hair removal techniques—including shaving, waxing, threading, or depilatory creams—offer only temporary cosmetic relief and often lead to complications such as folliculitis, skin irritation, and hyperpigmentation^[8]. Laser-assisted hair removal has emerged as a more effective and longer-lasting option. Technologies such as the long-pulsed Nd:YAG laser are particularly well-suited for individuals with darker skin phototypes (Fitzpatrick IV–VI), such as those common in South Asian populations, due to their deeper follicular penetration and minimal epidermal damage^[9]. However, laser treatment does not alter the endocrine drivers of hirsutism, and results may be suboptimal or short-lived without hormonal correction^[10]. To address both the root causes and clinical symptoms, combined treatment approaches are gaining popularity. Inositol isomers, particularly myo-inositol and D-chiro-inositol, have demonstrated effectiveness in restoring ovulatory cycles, enhancing insulin sensitivity, and lowering serum androgen levels in women with PCOS^[11]. These naturally occurring compounds function as insulin second messengers and have been shown to reduce acne, seborrhea, and hirsutism by modulating ovarian steroidogenesis^[12]. Integrating laser-based hair removal with inositol-based metabolic therapy represents a promising dual approach for managing hirsutism in PCOS. This strategy not only improves cosmetic outcomes but also addresses the underlying hormonal imbalance, offering sustained benefits with reduced recurrence risk^[13]. This study aims to assess the efficacy and safety of combining inositol-based medical therapy with laser-assisted hair removal for the treatment of hirsutism in women with PCOS.

Methodology & Materials

This was a prospective, case-control observational study conducted over 12 months from July 2023 to June 2024 at the Department of Dermatology, City International Medical College and Hospital, Gazipur, and the Laser Center at Ibn Sina Hospital, Dhaka, Bangladesh. The study was approved by the Institutional Ethics Committee and

written informed consent was obtained from all participants.

A total of 80 women aged 18 to 40 years, diagnosed with PCOS according to the Rotterdam criteria (2003) and presenting with hirsutism (Ferriman-Gallwey score ≥ 8), were enrolled. Participants were recruited through outpatient clinics and stratified into two groups:

- Intervention Group (n = 40): Received both medical therapy (Myo-inositol and D-chiro-inositol) and laser treatment.

- Control Group (n = 40): Received medical therapy alone (Myo-inositol and D-chiro-inositol).

Inclusion Criteria

- Women aged 18–40 years.
- Diagnosed with PCOS by at least two of the three Rotterdam criteria.
- Hirsutism with a Ferriman-Gallwey score ≥ 8 .
- Regular menstrual tracking for at least 6 months before enrollment.

Exclusion Criteria

- Pregnancy or lactation.
- Use of anti-androgenic medications, insulin sensitizers, or hormonal therapy within the past 6 months.
- History of adrenal or thyroid disorders, Cushing's syndrome, or androgen-secreting tumors.
- Active dermatologic conditions in laser-treated areas.
- History of photosensitivity or keloid formation.

Interventions

Medical Therapy

All participants in both groups received oral Myo-inositol (2 g) and D-chiro-inositol (50 mg), administered twice daily for 6 months, based on current clinical recommendations for metabolic and hormonal regulation in PCOS.

Laser Treatment

Participants in the intervention group underwent six sessions of laser hair reduction at 4-week intervals using a long-pulsed Nd:YAG laser (1064 nm). Parameters were tailored based on skin phototype, hair density, and tolerance, with appropriate cooling and post-treatment care.

Data Collection

Data were collected at three time points: baseline, 3 months, and 6 months. At enrollment, demographic information (age, weight, height, BMI), duration of PCOS, presence of acne, and menstrual irregularities were recorded using a structured case record form. Clinical assessment of hirsutism was performed using the modified Ferriman-Gallwey (FG) scoring system, with scores assessed independently by a trained dermatologist who was blinded to group allocation. FG scoring was repeated at 3 and 6 months to evaluate the change in hair

growth over time. Patient-reported outcomes were also collected at baseline and at the 6-month follow-up. These included the Dermatology Life Quality Index (DLQI) to assess the impact of hirsutism on quality of life and a Visual Analog Scale (VAS) to quantify patient satisfaction with treatment outcomes. Participants in the intervention group were additionally monitored for laser-related adverse events at each monthly laser session and follow-up visit. Any skin reactions such as erythema, pain, or pigmentary changes were documented and graded using the Common Terminology Criteria for Adverse Events (CTCAE), version 5.0. All participants were followed up through scheduled clinic visits and phone reminders to ensure compliance with therapy and attendance at follow-up assessments. Data were entered into a secure electronic database by trained research personnel and cross-verified for accuracy by an independent reviewer.

Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD) and compared using independent sample t-tests or Mann–Whitney U tests, as appropriate. Categorical variables were compared using chi-square or Fisher's exact test. Effect sizes were calculated using Cohen's d. Multivariable linear regression was used to identify factors independently associated with reduction in FG scores at 6 months. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of City International Medical College and Hospital. Written informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki (2013 revision).

Result

The study included 80 participants, divided equally between the intervention and control groups. Table 1 demonstrated baseline comparability. The mean age was 27.8 ± 5.2 years in the intervention group and 28.1 ± 5.5 years in controls ($p = 0.78$). BMI values were 26.3 ± 3.8 and 25.9 ± 4.1 ($p = 0.65$), while the duration of PCOS was 4.5 ± 2.0 and 4.7 ± 1.9 years ($p = 0.72$). Ferriman-Gallwey scores averaged 14.6 ± 3.5 and 14.3 ± 3.2 ($p = 0.68$). Acne was present in 18 (45.00%) and 20 (50.00%) participants, and menstrual irregularity occurred in 36 (90.00%) and 37 (92.50%) participants respectively. At baseline, scores were 14.6 ± 3.5 and 14.3 ± 3.2 . At 3 months, the scores reduced to 9.1 ± 2.8 and 12.7 ± 3.0 ($p < 0.001$), and at 6 months further to 5.4 ± 2.3 and 10.8 ± 3.1 ($p < 0.001$). Mean

reduction from baseline was 9.2 ± 2.7 in the intervention group and 3.5 ± 1.8 in controls ($p < 0.001$) (Table 2). Table 3 showed satisfaction scores at 6 months. Overall satisfaction was 8.7 ± 1.1 and 6.1 ± 1.4 , willingness to repeat treatment was 9.0 ± 1.0 and 6.3 ± 1.5 , and recommendation to others scored 8.9 ± 1.2 and 6.0 ± 1.3 , respectively, all showing significant differences ($p < 0.001$). Table 4 showed Dermatology Life Quality Index (DLQI) scores. At baseline, the mean DLQI scores were 14.2 ± 4.0 and 13.8 ± 3.8 for intervention and control groups ($p = 0.67$). At 6 months, scores were 5.6 ± 2.7 and 9.8 ± 3.1 respectively ($p < 0.01$), with a mean difference of 4.2 (95% CI: 2.2 to 6.2) and effect size of 1.34. The mean improvement in DLQI scores was 8.6 ± 3.9 for the intervention group and 4.0 ± 2.7 for controls ($p < 0.01$), with a difference of 4.6 (95% CI: 2.6 to 6.6) and effect size of 1.21. Mild erythema or redness occurred in 6 patients (15.00%), transient pain or discomfort in 4 patients (10.00%), and no cases of post-inflammatory hyperpigmentation were recorded. A total of 30 patients (75.00%) reported no adverse events (Table 5). Table 6 displayed multivariable linear regression findings. Intervention group treatment was significantly associated with a reduction in Ferriman-Gallwey score ($\beta = -5.6$; 95% CI: -6.9 to -4.3; $p < 0.001$). Baseline FG score also showed a significant association ($\beta = 0.18$; 95% CI: 0.02 to 0.34; $p = 0.03$). Age ($\beta = 0.02$; $p = 0.76$), BMI ($\beta = 0.05$; $p = 0.52$), and duration of PCOS ($\beta = 0.01$; $p = 0.95$) were not significantly associated.

Table 1: Baseline characteristics of study participants (N=80)

Characteristic	Intervention Group (n=40)	Control Group (n=40)	p-value
Age (years), mean $\pm$ SD	27.8 ± 5.2	28.1 ± 5.5	0.78
BMI (kg/m^2), mean $\pm$ SD	26.3 ± 3.8	25.9 ± 4.1	0.65
Duration of PCOS (years), mean $\pm$ SD	4.5 ± 2.0	4.7 ± 1.9	0.72
Ferriman-Gallwey score, mean $\pm$ SD	14.6 ± 3.5	14.3 ± 3.2	0.68

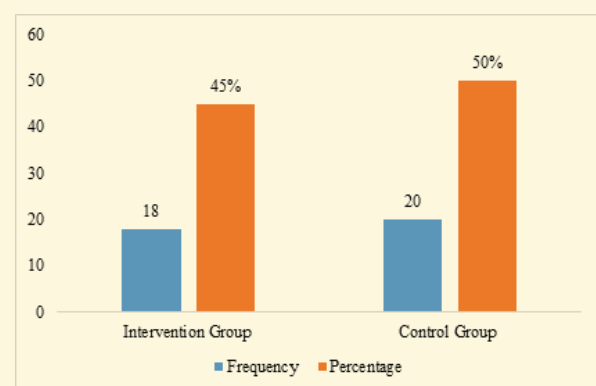


Fig 1: Presence of acne among participants

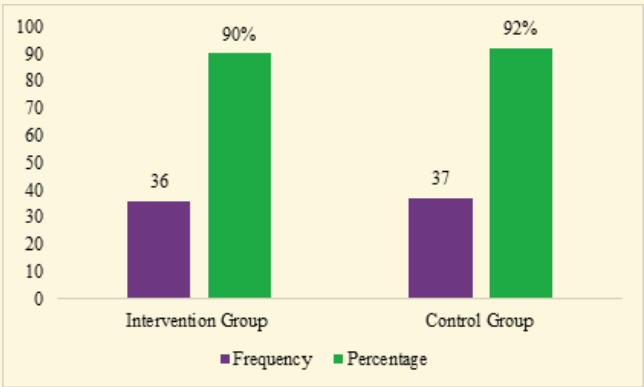


Fig 2: Menstrual irregularity among participants

Table 2: Change in Ferriman-Gallwey Score Over 6 Months

Time point	Intervention Group, (mean ± SD)	Control Group, (mean ± SD)	Between-group p-value	Mean Difference (95% CI)	Effect Size (Cohen's d)
Baseline	14.6 ± 3.5	14.3 ± 3.2	0.68	0.3 (-1.4 to 2.0)	0.09
3 Months	9.1 ± 2.8	12.7 ± 3.0	<0.001	3.6 (2.2 to 5.0)	1.18
6 Months	5.4 ± 2.3	10.8 ± 3.1	<0.001	5.4 (4.0 to 6.8)	1.9
Mean Reduction (Baseline - 6M)	9.2 ± 2.7	3.5 ± 1.8	<0.001	5.7 (4.4 to 7.0)	2.24

Table 3: Patient Satisfaction Scores at 6 months (Visual Analog Scale 0–10) following treatment for hirsutism in PCOS patients

Satisfaction Parameter	Intervention Group, mean ± SD	Control Group, mean ± SD	p-value	Mean Difference (95% CI)	Effect Size (Cohen's d)
Overall Satisfaction	8.7 ± 1.1	6.1 ± 1.4	<0.001	2.6 (1.8 to 3.4)	1.93
Willingness to Repeat Treatment	9.0 ± 1.0	6.3 ± 1.5	<0.001	2.7 (2.0 to 3.4)	2.12
Recommendation to Others	8.9 ± 1.2	6.0 ± 1.3	<0.001	2.9 (2.1 to 3.7)	2.23

Table 4: Dermatology Life Quality Index (DLQI) Scores at baseline and 6 months following treatment for hirsutism in PCOS patients

Time point	Intervention Group, mean ± SD	Control Group, mean ± SD	Between-group p-value	Mean Difference (95% CI)	Effect Size (Cohen's d)
Baseline	14.2 ± 4.0	13.8 ± 3.8	0.67	0.4 (-1.4 to 2.2)	0.11
6 Months	5.6 ± 2.7	9.8 ± 3.1	<0.01	4.2 (2.2 to 6.2)	1.34
Mean Improvement	8.6 ± 3.9	4.0 ± 2.7	<0.01	4.6 (2.6 to 6.6)	1.21



Fig 3: Before and after result of treatment for patient 1



Fig 4: Before and after result of treatment

Table 5: Frequency and severity of laser treatment-related adverse events in the intervention group (n=40)

Adverse Event	Number of Patients, n (%)	Severity (CTCAE v5.0)*
Mild erythema/redness	6 (15.00)	Grade 1 (Mild)
Transient pain/discomfort	4 (10.00)	Grade 1 (Mild)
Post-inflammatory hyperpigmentation	0 (0.00)	—
No adverse events	30 (75.00)	—

Table 6: Multivariable linear regression analysis of factors associated with reduction in ferriman-gallwey score at 6 months

Variable	β Coefficient	95% CI	p-value
Intervention group (vs. control)	-5.6	-6.9 to -4.3	<0.001
Age (years)	0.02	-0.12 to 0.16	0.76
BMI (kg/m²)	0.05	-0.11 to 0.21	0.52
Baseline FG score	0.18	0.02 to 0.34	0.03
Duration of PCOS (years)	0.01	-0.19 to 0.20	0.95

Discussion

Polycystic ovary syndrome (PCOS) is a common endocrine disorder characterized by clinical features such as hirsutism, which significantly impacts patients' quality of life and requires multidisciplinary treatment approaches [14]. This prospective study assessed combined medical and laser treatment for hirsutism in PCOS patients, showing significant improvement in hair reduction, patient satisfaction, and quality of life versus medical therapy alone. At baseline, both groups were comparable in age, BMI, PCOS duration, Ferriman-Gallwey (FG) score, and associated features such as acne and menstrual irregularities, ensuring homogeneity and reliability of comparisons. Over six months, the intervention group showed a significantly greater reduction in FG score (mean reduction: 9.2 vs. 3.5; $p<0.001$; Cohen's $d=2.24$), consistent with previous reports emphasizing the synergistic effect of laser-assisted hair removal with hormonal treatment. Similar trends were reported by Tan et al., who found that diode laser combined with anti-androgens significantly reduced hirsutism scores in PCOS patients over 6 months [15]. Patient-reported outcomes reinforced the clinical findings. Overall satisfaction, willingness to repeat treatment, and

recommendation scores were significantly higher in the intervention group (all $p < 0.001$; effect sizes > 1.9), aligning with findings from Dorgham et al., who highlighted improved treatment adherence and satisfaction when laser therapy was combined with pharmacologic interventions^[16]. Dermatology Life Quality Index (DLQI) scores improved markedly in the intervention group (mean improvement: 8.6 vs. 4.0; $p < 0.01$), reflecting enhanced psychosocial well-being. Similar improvements were observed in a study by Hosseini et al., where laser therapy led to substantial DLQI score reductions among hirsute women^[17]. Additionally, an observational study by Sakina et al. observed that laser therapy significantly improved the quality of life in women with PCOS-associated hirsutism, as assessed by DLQI scores^[18]. Importantly, laser treatment was well tolerated, with only mild and transient adverse effects such as erythema and discomfort reported in a minority of patients (25%), and no serious or long-term complications observed — consistent with the safety profiles reported by Gold et al. for laser hair removal in PCOS^[19]. Multivariable regression analysis confirmed that the intervention was the strongest predictor of FG score reduction ($\beta = -5.6$, $p < 0.001$), independent of age, BMI, or PCOS duration, indicating the treatment's robust efficacy. The significance of baseline FG score in predicting outcome ($\beta = 0.18$, $p = 0.03$) suggests that individuals with more severe hirsutism may derive proportionally greater benefit from combination therapy^[15]. Sakina et al. also showed similarities with this where they found that combining diode laser with metformin or combined oral contraceptives (COCs) produced significantly better hirsutism reduction than laser alone. This directly supports the intervention as a strong, independent predictor of FG score improvement^[18].

Limitations of the study: This study has several limitations. First, the sample size was relatively small and conducted at a single center, which may limit the generalizability of the findings. Second, the follow-up period of six months may be insufficient to assess the long-term efficacy and safety of combined medical and laser therapy in PCOS-related hirsutism. Third, patient adherence to medical therapy and laser sessions was self-reported, which could introduce reporting bias. Additionally, the study did not include a placebo or sham laser group, which might have strengthened the control comparison. Finally, hormonal and biochemical parameters related to PCOS pathophysiology were not extensively evaluated, limiting mechanistic insights into treatment effects.

Conclusion

The combination of medical therapy with myo-inositol and D-chiro-inositol alongside laser hair reduction significantly improved clinical outcomes in women with hirsutism secondary to polycystic ovary syndrome (PCOS). Compared to medical therapy alone, the combined approach resulted in greater reductions in Ferriman-Gallwey scores, higher patient satisfaction, and improved dermatology-related quality of life over six months, without serious adverse events. These findings suggest that integrating targeted hormonal therapy with laser treatment offers a safe and more effective strategy for managing PCOS-related hirsutism. Further large-scale, long-term studies are warranted to validate these results and assess sustained benefits beyond the treatment period.

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Conflict of interest

None declared

Ethical Approval

The study was approved by the Institutional Ethics Committee

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