Effect of Laser-Assisted Hair Removal (LAHR) on the Quality of Life and Depression in Hirsute Females: A Single-Arm Clinical Trial

Mahboubeh Sadat Hosseini[1] , **Amir Houshang Ehsani[2]** , **Yousef Fakour[3]** , **Zeinab Aryanian[4]** , **Mojtaba Elhamfar[5]**, **Pedram Noormohammadpour[2]***

[1]School of Medicine, Military Health Research Center, Life Style Institute, Baghiyyatollah al-Azam Hospital, Baqiyatallah University of Medical Sciences, Tehran, Iran
[2]Department of Dermatology, Tehran University of Medical Sciences, Tehran, Iran
[3]Vice Chancellery for Research & Technology, Iran Ministry of Health and Medical Education, Tehran, Iran
[4]Autoimmune Bullous Diseases Research Center, Department of Dermatology, Tehran University of Medical Sciences, Tehran, Iran
[5]Medical Student, Department of Dermatology, Tehran University of Medical Sciences, Tehran, Iran

*Correspondence to
Pedram Noormohammadpour,
Email: Email: normohamad@razi.tums.ac.ir

Abstract
Introduction: Hirsutism, mainly due to polycystic ovary syndrome (PCOS), causes stress, anxiety, and depression in females. Laser-assisted hair removal (LAHR) is currently accepted as a good treatment option for hirsutism. The goal of the current study was to ascertain how LAHR affected the degree of hirsutism, quality of life, and depression in hirsute females.
Methods: A single-arm before/after clinical trial was designed and performed in the Razi hospital Laser Clinic over a 15-month period. All hirsute females visiting the Razi hospital laser clinic were enrolled and received three sessions of LAHR every 4-6 weeks if they were interested and signed an informed consent form. Before the commencement of LAHR and six to eight weeks after the last session, the Ferriman-Gallwey score (hirsutism severity), Beck score (depression index) and DLQI score (quality of life index) were calculated and stored.
Results: There were 80 subjects in all. The mean±SD of the Ferriman-Gallwey score was reduced from 7.05 ± 2.27 to 4.91 ± 2.41, $P<0.001$. The mean±SD of the Beck depression score was reduced from 13.3 ± 8.7 to 10.2 ± 8.4, $P<0.001$, and the mean±SD of the DLQI score decreased from 5.6 ± 5.2 to 3.5 ± 2.3, $P<0.001$. No significant complications were reported.
Conclusion: LAHR can improve hirsutism-related depression and degradation of quality of life, as well as hirsutism physical signs.
Keywords: Hirsutism; Quality of life; Depression; Laser-assisted hair removal.

Introduction

The development of terminal hair in female body parts that are androgen-dependent is known as hirsutism.[1] The psychological and social consequences of unwanted hair are well known.[2] Hirsute women have a higher degree of psychiatric problems compared to the general population.[3] Hirsutism can impair females' quality of life.[4-6] This disorder affects between 5%-15% of women, considering its definition.[7] Anxiety and depression are major consequences.[8-10] Nowadays, laser-assisted hair removal (LAHR) is the most common procedure, currently approved to treat this disorder.[11] Although previous studies have shown a desirable effect of LAHR on hirsute females' quality of life through the assessment of DLQI,[10,12,13] they mainly used the visual analogue scale to evaluate the effect of LAHR on the severity of hirsutism and omitted the evaluation of depression as a major-related psychological problem. The goal of the current study was to assess how LAHR affected the quality of life, depression severity, and the Ferriman-Gallwey score which measures how severe hirsutism is.

Materials and Methods
Study Design
For 15 months from September 2016 to January 2018, this single-arm, single-center clinical investigation was carried out at Razi hospital laser clinic and was approved by the regional ethics committee at Tehran University of Medical Sciences. The women who visited Razi hospital laser clinic with facial hirsutism for the first time were

enrolled in this study after signing an informed consent form. They were excluded if they used psychotherapeutic medications during laser treatment, had a history of depression and anxiety disorder, or experienced remarkable life stress during the past three months. The patients who were pregnant, took any type of medicine to reduce hair growth, or were under the age of 18 were also not included. Moreover, the patients who had LAHR in the past year were not enrolled.

Evaluations and Interventions
Questionnaires
One of the most used psychometric tools for assessing the severity of depression is the Beck Depression Assessment,[14] a 21-question multiple-choice self-report inventory. This test is for people over 16 years of age and is tested for reliability and validity in the Persian language.[15] This questionnaire is a self-assessment test and takes 5 minutes. The subjects of the test consist of 21 subjects related to different signs in which the patient answers the questions according to a 4-point scale from 0 to 3. The topics covered include, for instance, melancholy, pessimism, emotions of failure and powerlessness, remorse, disturbed sleep, lack of appetite, and self-hatred. In this way, 2 subjects are dedicated to emotions, 11 to cognition, 2 to explicit behaviors, 5 to physical symptoms, and 1 to the interpersonal semiotic score. In this way of scoring, different degrees of depression are determined, from mild to very severe, and the range of its scores is between zero (at least) and 63 (at most). The scoring parameter for each question is 0-1-2-3. If the patient gets a total score from 1 to 10, the depression range is normal; 11-16, the patient has very mild depression; 17-20, the patient needs a psychiatric consult; 21-30, the patient has mild depression; 31-40, severe depression, and a score of more than 40 means the patient has very severe depression.

Dermatology Life Quality Index (DLQI) includes ten questions with multiple choice answers scoring from one to three, and it is simple, brief, and concise[16,17] and is validated in the Persian language.[18] It consists of 10 questions answered according to the previous week by the patient and covers the following topics: skin symptoms (itch-pain-burning sensation-uneasiness), patient's feelings (shyness-anger-confusion), everyday activities (household chores and shopping), attire, social and recreational activities, sports, job or school, and close connections. In this questionnaire, each question is scored from 0 to 3, giving a possible score ranging from 0 (meaning no impact of skin disease on the quality of life) to 30 (meaning maximum impact on the quality of life). The band descriptor was described to give meaning to the scores of the DLQI. These bands are as follows: No impact on the patient's life (0-1), Minimal impact (2–5), Moderate impact (6-10), Very large influence (11–20),

and extremely large effect (21–30). *The Ferriman–Gallwey*[19] scoring method was originally published in 1961 by D. Ferriman and J.D. Gallwey in the Journal of Clinical Endocrinology and encompasses the upper lip, the chin, the chest, the upper and lower backs, the abdomen, the upper and lower arms, and the upper and lower thighs. In each of the nine places, the rate of hair growth ranges from 0 (no growth of terminal hair) to 4 (large growth of hair). Therefore, a patient's score may range from a minimum of 0 to a high of 36. Considering the notable time and experience required to complete the original score for each patient, in the present study, we used a modified version of this score that involves three areas including the upper lip, lower abdomen, and thighs. A previous study showed 91.5% sensitivity and 92% specificity of this modified Ferriman-Gallwey score in diagnosing hirsutism in the Iranian population.[20]

Before the first LAHR treatment session, DLQI, the Beck (depression index) questionnaire, and the Ferriman-Gallwey modified hirsutism score were completed for all the patients, and the scores were saved in appropriate confidential forms. Six to eight weeks after the third LAHR session, DLQI and Beck questionnaires were again completed by the patients, and the scores were stored for later analysis.

Treatment
All the enrolled patients received three consecutive LAHR treatment sessions every 4-6 weeks using the Candela GentleMax Pro system with a dynamic cooling device as a cooling measure. The laser type and the setting are determined based on the Fitzpatrick skin type of each patient. Alexandrite 755 nm, Fluence: 18-14 J/cm^2, pulse duration: 3-10 ms were used for patients with Fitzpatrick skin types II-III, while Nd: YAG 1064 nm, Fluence: 26-22 J/cm^2, pulse duration: 3-10 ms were used for patients with higher skin types. Any adverse effects, including pigment alterations, long-lasting erythema, and scarring, if any, were recorded.

Statistical Analysis
Data analysis was carried out using the SPSS v. 26 program, with P values of 0.05 being considered significant. The results of the study before and after LAHR were compared using a paired sample t test.

Results
A total of 80 female patients whose ages ranged from 18-47 years were enrolled in the study (mean ± SD: 36.5 ± 9.3 years). Table 1 shows the results.

The mean modified *Ferriman–Gallwey* scores of the patients before and after LAHR were 7.05 and 4.91 respectively ($P < 0.0001$), which shows a significant objective improvement in hirsutism following LAHR.

The mean *Beck Depression Inventory* score was 13.30

Table 1. Results Before and After LAHR

	Age (Mean ± SD)	Ferriman-Gallwey Score	Beck Depression Score	DLQI Score
Before LAHR	36.5 ± 9.3	7.05 ± 2.27	13.3 ± 8.7	5.6 ± 5.2
After LAHR	-	4.91 ± 2.41	10.2 ± 8.4	3.5 ± 2.3
P value	-	< 0.001	< 0.001	< 0.001

before the commencement of LAHR sessions and 10.23 after the third session of the treatment (*P* < 0.0001).

The mean DLQI score was 5.6 before the LAHR intervention and 3.5 at the end of the study (*P* < 0.0001).

Except mild transient erythema and self-healing local irritation, no significant complication was recorded following the LAHR sessions.

Discussion

Hirsutism has a known negative impact on females' quality of life and may cause depression, anxiety, and other psychological problems.[4-6,9,10] LAHR is now considered an effective and safe treatment option to treat this disorder.[11,21,22] There are reports that confirm the improvement of hirsute females' quality of life following LAHR treatment[10,12,13] although some claim that results may not be sustainable.[23] Previous studies often used the visual analogue scale (VAS) as an objective score to scale the improvement of hirsutism, while we used modified Ferriman-Gallwey as a known and validated objective method[19,20] to assess the improvement of hirsutism, and this may improve the validity of this study. We evaluated the Beck depression score before and after the LAHR treatment, while previous studies quite often focused on DLQI as a main dependent variable.[10,12] Although DLQI can reflect the summative effect of a patient's mental status on functionality, it cannot provide direct information about depression, one of the most disabling psychologic disorders, with regard to hirsutism and any effect of LAHR on it. The present work showed that LAHR can improve hirsute females' quality of life significantly, and this is in agreement with previous published studies mentioned before, and this achievement could potentially increase the ability of patients to integrate into society. Evaluating Beck depression scores also showed an improvement in depression in hirsute females following LAHR, a finding less known previously.[24] Nowadays, LAHR for hirsutism is mainly considered as a cosmetic procedure, although it could be considered therapeutic, given the present findings.

A prominent cause of hirsutism is polycystic ovary syndrome (PCOS),[25,26] which can be treated with both pharmaceutical medication and direct hair removal techniques like LAHR.[27] It seems that LAHR might be considered as a standard part of PCOS treatment. In fact, PCOS brings depression, anxiety and perceived stress to females' lives[28,29] and LAHR can be part of the solution, both medical and psychological. The primary limitation

of the present study is the absence of a control group, which is followed by the absence of long-term follow-up. It was not ethical not to treat some patients as a control group. However, evaluating patients several months after the last session of LAHR can assess the long-term effect of LAHR on patients' quality of life and potential depression.

In conclusion, based on the current study, LAHR can improve hirsute females' quality of life, depression, and appearance, taking into account positive changes in DLQI, Beck, and modified Ferriman-Gallwey scores.

References

1. Sachdeva S. Hirsutism: evaluation and treatment. Indian J Dermatol. 2010;55(1):3-7. doi: 10.4103/0019-5154.60342.
2. Rabinowitz S, Cohen R, Le Roith D. Anxiety and hirsutism. Psychol Rep. 1983;53(3 Pt 1):827-30. doi: 10.2466/pr0.1983.53.3.827.
3. Barth JH, Catalan J, Cherry CA, Day A. Psychological morbidity in women referred for treatment of hirsutism. J Psychosom Res. 1993;37(6):615-9. doi: 10.1016/0022-3999(93)90056-l.
4. Drosdzol A, Skrzypulec V, Plinta R. Quality of life, mental health and self-esteem in hirsute adolescent females. J Psychosom Obstet Gynaecol. 2010;31(3):168-75. doi: 10.3109/0167482x.2010.501398.
5. Lipton MG, Sherr L, Elford J, Rustin MH, Clayton WJ. Women living with facial hair: the psychological and behavioral burden. J Psychosom Res. 2006;61(2):161-8. doi: 10.1016/j.jpsychores.2006.01.016.
6. Sonino N, Fava GA, Mani E, Belluardo P, Boscaro M. Quality of life of hirsute women. Postgrad Med J. 1993;69(809):186-9. doi: 10.1136/pgmj.69.809.186.
7. Azziz R. The evaluation and management of hirsutism. Obstet Gynecol. 2003;101(5 Pt 1):995-1007. doi: 10.1016/s0029-7844(02)02725-4.
8. Cronin L, Guyatt G, Griffith L, Wong E, Azziz R, Futterweit W, et al. Development of a health-related quality-of-life questionnaire (PCOSQ) for women with polycystic ovary syndrome (PCOS). J Clin Endocrinol Metab. 1998;83(6):1976-87. doi: 10.1210/jcem.83.6.4990.
9. Guyatt G, Weaver B, Cronin L, Dooley JA, Azziz R. Health-related quality of life in women with polycystic ovary syndrome, a self-administered questionnaire, was validated. J Clin Epidemiol. 2004;57(12):1279-87. doi: 10.1016/j.jclinepi.2003.10.018.
10. Loo WJ, Lanigan SW. Laser treatment improves quality of life of hirsute females. Clin Exp Dermatol. 2002;27(6):439-41.

doi: 10.1046/j.1365-2230.2002.01071.x.

11. Lee CM. Laser-assisted hair removal for facial hirsutism in women: a review of evidence. J Cosmet Laser Ther. 2018;20(3):140-4. doi: 10.1080/14764172.2017.1376099.

12. Alizadeh N, Ayyoubi S, Naghipour M, Hassanzadeh R, Mohtasham-Amiri Z, Zaresharifi S, et al. Can laser treatment improve quality of life of hirsute women? Int J Womens Health. 2017;9:777-80. doi: 10.2147/ijwh.s137910.

13. Maziar A, Farsi N, Mandegarfard M, Babakoohi S, Gorouhi F, Dowlati Y, et al. Unwanted facial hair removal with laser treatment improves quality of life of patients. J Cosmet Laser Ther. 2010;12(1):7-9. doi: 10.3109/14764170903449802.

14. Richter P, Werner J, Heerlein A, Kraus A, Sauer H. On the validity of the Beck Depression Inventory. A review. Psychopathology. 1998;31(3):160-8. doi: 10.1159/000066239.

15. Ghassemzadeh H, Mojtabai R, Karamghadiri N, Ebrahimkhani N. Psychometric properties of a Persian-language version of the Beck Depression Inventory--Second edition: BDI-II-PERSIAN. Depress Anxiety. 2005;21(4):185-92. doi: 10.1002/da.20070.

16. Finlay AY. Quality of life indices. Indian J Dermatol Venereol Leprol. 2004;70(3):143-8.

17. Basra MK, Fenech R, Gatt RM, Salek MS, Finlay AY. The Dermatology Life Quality Index 1994-2007: a comprehensive review of validation data and clinical results. Br J Dermatol. 2008;159(5):997-1035. doi: 10.1111/j.1365-2133.2008.08832.x.

18. Aghaei S, Sodaifi M, Jafari P, Mazharinia N, Finlay AY. DLQI scores in vitiligo: reliability and validity of the Persian version. BMC Dermatol. 2004;4:8. doi: 10.1186/1471-5945-4-8.

19. Ferriman D, Gallwey JD. Clinical assessment of body hair growth in women. J Clin Endocrinol Metab. 1961;21:1440-7. doi: 10.1210/jcem-21-11-1440.

20. Ramezani Tehrani F, Minooee S, Azizi F. Validation of a simplified method to assess hirsutism in the Iranian population. Eur J Obstet Gynecol Reprod Biol. 2014;174:91-5. doi: 10.1016/j.ejogrb.2013.12.008.

21. Davoudi SM, Behnia F, Gorouhi F, Keshavarz S, Nassiri Kashani M, Rashighi Firoozabadi M, et al. Comparison of long-pulsed alexandrite and Nd:YAG lasers, individually and in combination, for leg hair reduction: an assessor-blinded, randomized trial with 18 months of follow-up. Arch Dermatol. 2008;144(10):1323-7. doi: 10.1001/archderm.144.10.1323.

22. Haedersdal M, Wulf HC. Evidence-based review of hair removal using lasers and light sources. J Eur Acad Dermatol Venereol. 2006;20(1):9-20. doi: 10.1111/j.1468-3083.2005.01327.x.

23. Roche A, Sedgwick PM, Harland CC. Laser treatment for female facial hirsutism: are quality-of-life benefits sustainable? Clin Exp Dermatol. 2016;41(3):248-52. doi: 10.1111/ced.12775.

24. Clayton WJ, Lipton M, Elford J, Rustin M, Sherr L. A randomized controlled trial of laser treatment among hirsute women with polycystic ovary syndrome. Br J Dermatol. 2005;152(5):986-92. doi: 10.1111/j.1365-2133.2005.06426.x.

25. Meier RK. Polycystic ovary syndrome. Nurs Clin North Am. 2018;53(3):407-20. doi: 10.1016/j.cnur.2018.04.008.

26. Spritzer PM, Barone CR, Oliveira FB. Hirsutism in polycystic ovary syndrome: pathophysiology and management. Curr Pharm Des. 2016;22(36):5603-13. doi: 10.2174/1381612826661607201512 43.

27. Grymowicz M, Rudnicka E, Podfigurna A, Napierala P, Smolarczyk R, Smolarczyk K, et al. Hormonal effects on hair follicles. Int J Mol Sci. 2020;21(15):5342. doi: 10.3390/ijms21155342.

28. Kolhe JV, Chhipa AS, Butani S, Chavda V, Patel SS. PCOS and depression: common links and potential targets. Reprod Sci. 2021. doi: 10.1007/s43032-021-00765-2.

29. Damone AL, Joham AE, Loxton D, Earnest A, Teede HJ, Moran LJ. Depression, anxiety and perceived stress in women with and without PCOS: a community-based study. Psychol Med. 2019;49(9):1510-20. doi: 10.1017/s0033291718002076.