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ORIGINAL CONTRIBUTION

The healing effects of facial BOTOX injection on symptoms of depression alongside its effects on beauty preservation

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Abstract

Background: Beauty is closely associated with a sense of calm, confidence, and hope for a better life. Therefore, it is expected that improving the appearance or even correcting one's view of appearance can prevent depression and even improve different degrees of depression in individuals.

Aims: Investigation of whether using botulinum injections (a common method of improving facial esthetics) can improve the degree of depression in clients.

Methods: This prospective interventional before-after study was conducted on 121 consecutive individuals referred for beautifying the face. Before performing the interventional procedure by facial botulinum injection as well as one month later, the depression status was examined by the Beck Depression Inventory II (BDI) questionnaire.

Results: The mean baseline depression score dropped from 18.9 ± 4.8 to 10.6 ± 2.9 during the follow-up time ($P < .001$). Using the multivariable linear regression modeling and with the presence of baseline parameters, the main determinants of improving depression score included young ages (beta = −0.541, $P = .001$), higher educational level (beta = 0.595, $P = .015$), and previous experiences of botulinum toxin use (beta = 1.072, $P = .036$).

Conclusion: The improvement in people's moods along with correction of their facial defects following botulinum toxin injections would be expected.

KEYWORDS
Beauty, BOTOX, Botulinum toxin, Mood

1 | INTRODUCTION

Facial beauty is accompanied by a sense of calm and high self-esteem. Obviously, people with a more beautiful and dependable appearance have more acceptance in society and thus appear more energized and confident in individual and social activities. [1] Conversely, the presence of congenital or acquired defects in appearance and form may, in the long run, develop isolation resulting in avoidance of social relationships in individuals and in more severe cases depression and mood disorders. [2,3] Essentially, the reason people go to dermatologists is to improve the beauty and appearance of their face and to achieve a more attractive look with the aim of maintaining and strengthening their position in the family and among their friends as well as in the community.[4] Therefore, the causal relationship between beauty preservation in the face and appearance and reduced risk of future mood disorders is to be expected. Even more recently, beauty preservation procedures have been used as alternative therapies in patients with depression leading to favorable outcomes. [5,6] Botulinum toxin type A is now globally used for beautifying facial components by temporarily paralyzing the facial muscles. The

main principles of botulinum effects are to reduce the appearance of fine lines and wrinkles as well as to suppress excessive sweating or muscle spasms. It should also be noted that other factors such as physician's skill, used a dose of botulinum, therapeutic goals, history of hypersensitivity to botulinum, and causes of botulinum injection are contributing to outcomes and adverse effects following beautification procedure with Botulinum. [7,8] Nowadays, botulinum therapy may be an effective treatment option for depression along with antidepressants. [9] The main hypothesis for the proposed beneficial effects of botulinum toxin in depression is through facial feedback. Low mood and depression are often associated with sad facial expression. It has long been observed that MDD patients often have deep vertical frown lines and different signs, such as "omega melancholicum" sign and Veraguth's folds, have been described.[10] Injecting botulinum toxin and improving facial expression would lead to improvement of symptoms of depression. However, there are many inconsistencies regarding the therapeutic and/or deleterious effects of botulinum on the psychological and mood aspects of individuals. Some authors could demonstrate high efficacy for the alleviation of major depression.[11,12] However, such suggestions were weak in some other studies. [13] Hence, we aimed to examine the therapeutic effects of botulinum injection on depressive mood in individuals referred for cosmetic goals.

2 | MATERIALS AND METHODS

This prospective interventional before-after study was conducted on 121 consecutive individuals referred to the authors' private clinic aimed at beautifying the face. The inclusion criteria were lack of hypersensitivity to botulinum, and satisfaction for enrollment in the study, and the exclusion criteria were lack of possibility for follow-up and lack of satisfaction for incorporation in the study. History of using botulinum, history of having mood disorders, previously receiving antidepressants, and scheduling for cosmetic procedures in other body components were not considered as the exclusion criteria and thus were recorded as the contextual variables. The local ethical committee approved the study, and the Helsinki Declaration was respected all over the study course. In addition, incorporating subjects signed the informed consent form before any intervention. Baseline characteristics including demographics, anthropometric parameters, marital status, educational level, and job status, history of skin or systemic disorders, and previous history of using were all collected by face to face interviewing the subjects. Before performing the interventional procedure, their mood condition was examined using the Persian Beck Depression Inventory II (BDI) questionnaire subjectively, which scores on a range from 0 (best) to 63 (worst). As a general rule, a score of 19-14 is defined as mild depression, a score of 20-28 is moderate depression, and a score of 28 to 63 is defined as severe depression.[14] The validity and reliability of the BDI-II-PERSIAN Questionnaire were performed in 2005 by Ghassemzadeh et al[15] Following initial mood assessment, all participants underwent Botulinum injection (Dysport or Masport) (based on the standard protocol) in the areas diagnosed by the physician. Major areas of the face injections included frown line, forehead, and eye circumference. One month after primary botulinum injection and on a revisiting, mood status was re-checked by similar inventory. The study endpoint was to determine the change in depression score following botulinum injection. The results were presented as mean ± standard deviation (SD) for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. The normality of data was analyzed using the Kolmogorov–Smirnoff test. Quantitative variables were compared with t test or Mann-Whitney U test. The change in depression score after botulinum-based intervention was tested by the Pearson's or Spearman's correlation test. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc, Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

TABLE 1 Baseline characteristics of study population

Mean age, year	35.72 ± 4.78
Mean body mass index, kg/m^2	27.45 ± 2.65
Female gender	110 (90.9%)
Education level	
Primary level	3 (2.5%)
Diploma	39 (32.2%)
Academic degree	79 (65.3%)
Occupation status	
Employed	24 (19.8%)
Self-employed	40 (33.0%)
Retired	6 (5.0%)
Housewife	51 (42.2%)
History of skin disease	11 (9.1%)
History of systemic disorder	13 (10.7%)
History of botulinum injection	107 (88.4%)

3 | RESULTS

In total, 121 cases for botulinum injection with the purpose of beautifying were included in our intervention. The average age of participants was 35.72 ± 4.78 years, and most of the subjects (90.9%) were female. The mean body mass index was 27.45 ± 2.65 kg/m^2. Regarding educational level, two-thirds of individuals had an academic degree (Table 1). With respect to occupational condition, 24 (19.8%) were employed, 40 (33.0%) were self-employed, 6 (5.0%) were retired, and others were housewife. The previous history of skin diseases (mostly eczema and skin allergies) was found in 9.1%, and 10.7% suffered from systemic disorders (hypothyroidism, diabetes, and hypertension). Also, 88.4% had a history of Botulinum injection, 69.4% more than once. At the last follow-up, all patients were satisfied with botulinum toxin injection and did not have any complication as eyebrow ptosis, eyelid ptosis, etc The mean depression scores on admission were estimated to be 18.9 ± 4.8 indicating

TABLE 2 Score of the patients before and after treatment

	Before Intervention		After Intervention score of the patients
None	56 cases (46.2%)	11.4 ± 1.3	5.2 ± 1.5
Mild depression	36 cases (29.7%)	16.8 ± 2.0	15.8 ± 1.9
Moderate depression	18 cases (14.9%)	25.1 ± 2.5	23.1 ± 2.0
Severe depression	11 cases (9.0%)	53.8 ± 4.7	34.7 ± 3.1
Total mean	121 cases (100%)	18.9 ± 4.8	10.6 ± 2.9

none or minimal depression in 56 cases (46.2%), mild depression in 36 (29.7%), moderate depression in 18 (14.9%), and severe depression in 11 (9.0%). The mean depression score dropped significantly to 10.6 ± 2.9 during the follow-up time and following botox injection (P <.001). Dropping depression score occurred in the whole samples suffering different degrees of depression initially (table 2). Using the multivariable linear regression modeling and with the presence of baseline parameters (Table 3), the main determinants of improving depression score included young ages (beta = - 0.541, P =.001), higher educational level (beta = 0.595, P =.015), and previous experiences of botox use (beta = 1.072, P =.036).

TABLE 3 Main indicators of dropping depression score in multivariable linear regression model

	Unstandardized Coefficients		Standardized Coefficients	
Item	Beta	Std. Error	Beta	*P* value
(Constant)	2.506	11.622		.831
Female gender	0.702	2.421	0.042	.774
Age	−0.004	0.001	−0.541	.001
BMI	0.879	3.246	0.039	.788
Education	12.645	4.856	0.595	.015
Job status	−3.266	3.152	−0.162	.309
Skin disorder	0.016	0.056	0.042	.779
Systemic disease	−0.009	0.016	−0.079	.583
History of botulinum use	2.214	3.459	1.072	.036

4 | DISCUSSION

Beauty is closely associated with a sense of calm, confidence, and hope for a better life. In contrast, an undesirable image of one's appearance can be associated with stress, anxiety, and even depression. Therefore, it is expected that improving the appearance or even correcting one's view of appearance can prevent depression and even improve different degrees of depression in individuals. What we discussed in this study was to investigate whether using botulinum injections as a common method of improving facial esthetics can improve the degree of depression in clients. In this regard, we could show a considerably dropping depression score assessed by the Beck Depression Inventory in almost all subjects with a degree of depression. In other words, although almost half of the participants suffered initially from different degrees of depression, the number of subjects suffering depression after our intervention dropped to 8.2% indicating the high efficiency of facial botulinum injection as a technique for facial beautifying on depression improving. Most previous studies have tested the usefulness of botulinum injection among depressive people, while our study focused on a sample of the general population referred to our clinic because of the preservation and promotion of their facial beauty. Thus, it seems that not only botulinum injection has an effect on a person's beauty and rejuvenation, but it can also be useful to reduce depression. Previous studies could similarly demonstrate the beneficial effects of botulinum injection on the improvement of mood disorders. In a review study on randomized controlled trials by Magid in 2015,[16] the improvement in the depression scale occurred six weeks after baseline in 45.7% of depressive patients who experienced botulinum injection versus in 14.6% in the group who received placebo. In other words, a single treatment of botulinum injection into the glabellar region could reduce symptoms of depression. In a study by Finzi et al in 2014, [17] the response rates to a botulinum toxin A treatment at six weeks from the date of injection were 52% and 15% in the intervention and placebo groups indicating significant and sustained antidepressant effects of botulinum injection in patients with major depression. In another review study by Stearns et al in 2018, [18] botulinum injection with the therapeutic goal among major depressive patients can be considered as a promising treatment for depression. Chugh et al could also show that almost all of the depressive patients improved clinically, with depression scores dropping by 27% on all depression scales in the sample as a whole, and thus finally concluded that Botulinum injection might be effective in the treatment of depression. [19]

5 | LIMITATIONS

In this study, there were several limitations. One of these limitations was the follow-up time of individuals in this study. The next one was the heterogeneous group of patients with different degrees of depression. In future studies, it is better to let's try to eliminate limitations.

Change of lifestyle and notice to cosmetic and therapeutic aspects of many dermatologic concerns and disorders results in better management of them and logically impacts on psychological issues especially about immune-mediated dermatologic disorder like

psoriasis, vitiligo and lichen planus,[20-22] acne,[23-27] melasma and pimentary disorders,[28-31] scars,[32-34] and alopecia,[35] that is, what we approached in this study, too.

6 | CONCLUSION

Improvement in people's mood along with correction of their facial defects following botulinum injections would be quite expected. More interestingly, this mood healing is predicted more among younger and highly educated individuals, because we believe that such people have a more realistic understanding of the relationship between beautiful appearance and confident nature. Moreover, older people are more at risk for depression and its persistence.

DATA AVAILABILITY STATEMENT

All data used to support the findings of the study are included within the articles, and the core of the data is fully available and presentable.

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CONFLICT OF INTEREST

The authors have no conflict of interest (none declare).

AUTHOR CONTRIBUTIONS

MKh and MR contributed to conception and design. MKh and AG were involved in drafting the manuscript. MKh, FS, and MD revised the paper critically for important intellectual content. AKh revised and searched the literature and submitted first and final version. AG was involved in acquisition of data and analysis of first and revised version of the article. FS and MD (new authors) contributed equally to editing, analyzing, and revising the revised version. All authors gave final approval of the version to be published. The team has participated sufficiently in the work to take public responsibility for appropriate portions of the content, and was agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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