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## Research Article

# THE EFFECT OF NON-INVASIVE AND MINI-INVASIVE AESTHETIC PROCEDURES ON HEALTH-RELATED QUALITY OF LIFE

**\*Mihaylov M.P and Velkova A.S**

Department of Social Medicine, Faculty of Public Health, Medical University - Sofia, Bulgaria

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### ABSTRACT

Clients' demand for non-invasive and mini-invasive aesthetic procedures as a fast and efficient alternative of the aesthetic surgery is expanding. Health-related quality of life (HRQoL) is increasingly used in aesthetic medicine to quantify the patients' health experience related to aesthetic procedures applied. The objective of the study was to assess the HRQoL of patients before and after the performance of aesthetic non-invasive or mini-invasive procedures in outpatient settings. A prospective multicentric study was conducted in 6 outpatient clinics of aesthetic medicine in Bulgaria over a period of 14 months, with 480 participants involved. Data on demographic and social characteristics, self-rated health, depressive mood and some other variables were collected by a self-administered survey. HRQoL was measured before and after the aesthetic procedures by an adapted instrument based on standardized Bulgarian version of Sckindex29. After the completion of the aesthetic treatment protocol, HRQoL improved significantly in the three domains with the highest enhancement in the Emotions and Functioning scales. The positive change of the initial score for the Emotions scale was 35.32% and the total score of HRQoL improved by 30.34% as a result of the aesthetic procedures. The post-treatment improvement of HRQoL remained after controlling for the effect of sex, age, education, marital and social status, self-rated health and depression. Measuring HRQoL in non-surgical aesthetic practice has to be introduced as a regular assessment procedure. It will help to manage effectively the comprehensive process of aesthetic treatment and care, taking into account the patient perspective.

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## INTRODUCTION

Aesthetic non-invasive and mini-invasive procedures have become an ordinary medical activity not only in the US, Europe and other high-income regions but also in less prosperous regions of the world during the last decades<sup>1-3</sup>. Changes in the individual and social values have confirmed youthful image as a sign of beauty, potential and promising future and thus facilitate the enormous increase in numbers of aesthetic non-surgical procedures performed<sup>4,5</sup>. Clients' demand for aesthetic procedures as a fast and efficient alternative of the aesthetic surgery is expanding. The economic prosperity of some social strata, as well as social and cultural shifts, technological and medical advances, media pressure, and lack of regulatory control, are among the leading factors, contributing to the upswing of aesthetic mini-invasive interventions<sup>6</sup>.

Some authors raise the question of whether the aesthetic procedures constitute a medical practice at all since they are

done on healthy people and do not have an immediately obvious healing rationale<sup>7</sup>. Many others believe that the non-invasive and mini-invasive aesthetic procedures actually represent medical care: they are delivered by medical professionals with the purpose to satisfy the aesthetic needs of the patients by visibly eliminating the appearance imperfections, thus positively affecting patients' physical, mental and social well-being. The American Academy of Aesthetic Medicine (AAAM) offers the following definition: Aesthetic Medicine comprises all medical procedures that are aimed at improving the physical appearance and satisfaction of the patient, using non-invasive to minimally invasive cosmetic procedures<sup>8</sup>. In different countries that new development in medical practice has been presented under various terminology - aesthetic medicine, cosmetic medicine, aesthetic dermatology, anti-ageing medicine, regenerative medicine, and so on. The distinction from plastic-reconstructive, reconstructive and aesthetic surgery is based on the level of invasiveness of the procedures applied. Aesthetic medicine handles non-invasive and minimally invasive procedures that require only cutaneous

\*Corresponding author: **Mihaylov M.P**

Department of Social Medicine, Faculty of Public Health, Medical University - Sofia, Bulgaria

and subcutaneous injection, pricking or small incisions. In these procedures, botulinum toxin, resorbable fillers, lipofilling, lifting (lifting by non-resorbable sutures), various forms of lipoplasty, laser, intense pulse light, etc., are used. The patients seeking non-surgical aesthetic procedures usually are healthy and they often aim at improving their appearance in order to maintain and improve other aspects of life.

Health-related quality of life is an important outcome measure largely used to evaluate the effect of different interventions on physical, mental and social functioning and well-being of the patients. It is increasingly used in aesthetic medicine to quantify the patients' health experience related to their aesthetic problems and the aesthetic procedures applied<sup>9-10</sup>.

The HRQoL effects of surgical aesthetic procedures have been evaluated often and some specific instruments for their assessment have been developed. Although similar positive effects on self-esteem, body image, self-confidence and social confidence have been established for the non-invasive and mini-invasive aesthetic procedures as well, few scientific studies have evaluated their impact on HLQoL.

We conducted this study with the aim to assess the HRQoL of patients before and after the performance of aesthetic non-invasive or mini-invasive procedures in outpatient clinics of aesthetic medicine.

## MATERIALS AND METHODS

**Study design and location:** A prospective multicentric study was carried out among the outpatient clinics of aesthetic medicine in Bulgaria, offering only non-surgical aesthetic services. The study involved three aesthetic clinics in the capital city of Sofia, two clinics in the regional centres and an aesthetic centre in a town with less than 50 000 inhabitants. The participating centres were selected as being representative in respect to the performed aesthetic procedures and to the characteristics of the patients seeking aesthetic non-surgical treatment.

**Participants:** The participants of the study were recruited among the patients with skin-related aesthetic problems who attended the aesthetic clinics for non-invasive and micro-invasive procedures in the period December 2016 - February 2018. Every third person visiting the research centers for a first AP was invited to enter the study. Patients were uniformly informed orally about the study protocol by a physician from the research team and an informed consent was obtained. Out of the invited 598 patients 493 (82.44%) gave consent to participate and entered the study. We analysed the data of 480 (97.36%) participants who completed the entire cycle of aesthetic procedures according to the standard protocol for each intervention. Females and the age group 35-54 yrs. dominated the study population. The basic demographic and social characteristics of the participants are presented at table 1.

**Table 1** Demographic and social characteristics of the participants (n = 480)

Characteristics	N	%
Sex		
Male	105	21.78
Female	375	78.12
Age group		
≤ 34 yrs.	184	38.34

35+ yrs.	296	61.66
Education		
≤ 8 yrs.	22	4.58
Secondary	210	43.75
Higher	248	51.67
Family status		
Married	131	27.29
Cohabitation	98	20.41
Single	152	31.67
Divorced	80	16.67
Widowed	19	3.96
Social status		
Employed	338	70.42
Unemployed	81	16.88
Student	48	10.00
Pensioner	13	2.70

Information to assess the effect of aesthetic procedures on HRQoL was collected before the implementation of the treatment, at study enrolment (T1), and after completion of the final aesthetic procedure, during the last visit to the clinic (T2). The time period of aesthetic interventions varied from one week for facial fillers up to 6 months for laser procedures. For the participants who received one-time facial fillers the second assessment of HRQoL was completed during a follow-up visit in a month (30-31 days) after the procedure.

**Methods and instruments:** Personal information was collected by a self-administered questionnaire consisted of 39 items. The first part of the instrument provided data on some important confounding variables - demographic and social characteristics, lifestyle and motivational factors, self-rated overall health and depressive mood. Self-rated health was measured by EuroQol-visual analogue scale (EQ-VAS) from the EQ-5D instrument before and after the aesthetic procedures<sup>11-12</sup>. Patients ranked their own health on a vertical graphic scale between 0 (the worst health) and 100 (the best health). At the beginning of study, we explored the presence of anhedonia and depressive mood in patients by Scored Patient Health Questionnaire-2 (PHQ-2)<sup>13-14</sup>. It is a simple instrument of 2 questions which identifies individuals with a higher probability of any depressive disorder. This test is commonly used in primary care settings as an initial screening tool for possible depression. The questions ask about the frequency of experiencing "Little interest or pleasure in doing things" and "Feeling down, depressed, or hopeless." over the last two weeks. Potential responses range from "Not at all" to "Nearly every day" and are scored from 0 to 3 points for each item. An overall score of 3 or more points on PHQ-2 indicates a higher risk for depressive disorder and the patient needs further evaluation.

The second part of the questionnaire examined the main outcome - HRQoL of patients before and after the aesthetic procedures. As a basis for the questions in this part we used Skindex-29 - a psychometric questionnaire for the quality of life of patients with any dermatologic condition, originally developed by Mary-Margaret Chren in 1996, as a questionnaire with 61 items<sup>15-16</sup>. We adapted for this survey the version of the questionnaire translated and validated for the Bulgarian population by S. Valkova and A. Velkova in 2005<sup>17-18</sup>. In the adapted questionnaire, we used 19 questions from the translated original version of Scindex29 to examine the impact of aesthetic procedures in three areas of health related quality of life - physical and social functioning (8 questions), emotions (8 questions) and symptoms (3 questions). The expression "skin condition" from the original questionnaire was replaced

in all items by the phrase “aesthetic problem”. Individual questions of the adapted instrument were presented in the form of statements about a phenomenon in each domain, and the respondents reported how often they had experienced it over the last 4 weeks. For all the 19 adapted items the responses followed the format of the original questionnaire presented in a five-point scale with categories of frequency ranging from “never” to “all the time”.

All selected individual items included in the adapted questionnaire on HRQoL in patients undergoing non-surgical AP showed satisfactory or high psychometric efficacy with corrected item-total correlations varying from 0.65 to 0.84. The adapted questionnaire demonstrated to measure the three basic domains of quality of life related to skin conditions. The measuring power of the constructed by us instrument did not change significantly after the elimination of any of the items included.

Reliability measures of the three scales and of overall HRQoL instrument were high and very high. Cronbach’s alpha ( $\alpha$ ) was 0.79 for the Symptoms scale, for the Functioning scale it was 0.91, for the Emotions scale - 0.92 and went up to 0.95 for the overall questionnaire.

Factor analysis of the adapted questionnaire items yielded the three-factor solution, with the factors extracted according to the criterion of eigenvalues higher than 1.0. That result confirmed the three-factor solution reported for the original version of Skindex29, which was the basis for subscales development. The items of the adapted questionnaire that belonged originally to the Emotions scale accounted alone for more than a half (55.77%) of the variance in the HRQoL. Altogether, the three extracted factors in our analysis explained more than 68% of the variance.

**Statistical analysis:** The collected data were processed using the statistical software packages SPSS for Windows, v. 23 and Microsoft Office Excel 2013. Mean values and standard deviations or median and interquartile dimensions (in nonparametric distribution) described the quantitative variables. Qualitative variables were presented by the proportions of their categories. To check for normality of distribution we applied Kolmogorov-Smirnoff test. Due to the skewed distribution of self-rated health measured by EQ-VAS, we analysed the effect of this variable by quartiles. The individual score on depression instrument was calculated as a simple sum of the points of the two answers. The responses of each individual item of the adapted questionnaire on HRQoL were scored from 1 to 5. For each scale (functioning, emotions, symptoms) score was obtained as a mean of the individual items of each domain. We also calculated an overall (total) score of HRQoL representing the mean of the three scale-scores. Afterwards, these results were transformed into a linear scale from 0 (no effect) to 100 (maximum effect). Higher scores reflect more pronounced impairment of HRQoL. The comparisons of HRQoL scores before and after the aesthetic interventions were made by paired samples t-test or Wilcoxon signed ranks test. Correlation analysis was applied to test for an association. We set a level of significance at  $p < 0.05$ .

## RESULTS

The scale scores and overall scores on the adapted HRQoL questionnaire at baseline and after the aesthetic treatment are presented at figure 1. The highest score before the aesthetic procedures was obtained for the Emotions scale, indicating that the aesthetic problems most severely affect the emotional functioning. Symptoms appeared to be the least affected area of HRQoL before the aesthetic intervention.

After the completion of the standard protocol for the selected aesthetic procedure, the assessment of HRQoL revealed that the scale scores and the total score dropped significantly, indicating an improvement of HRQoL (fig 1.). All the observed differences in the scales scores and the overall score before and after the aesthetic procedures were significant ( $p = 0.001$ ). The highest impact of aesthetic interventions was found out for Emotions scale with a positive change of the initial score by 35.32%. Total score of HRQoL improved by 30.34% as a result of the aesthetic procedures.

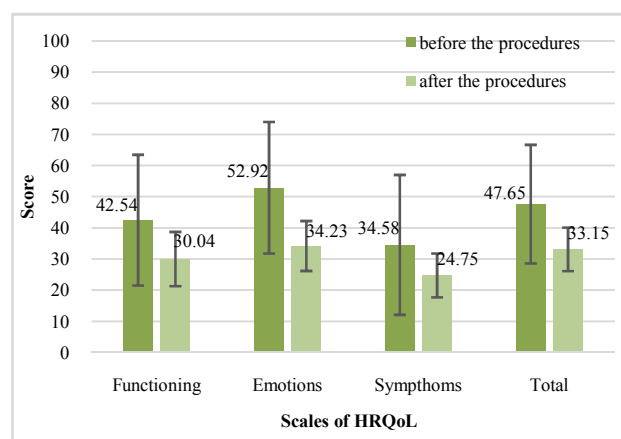


Fig 1 HRQoL scores before and after the aesthetic procedures (mean  $\pm$ SD)

We analysed statistically the domains scores of the adapted questionnaire on HRQoL before and after the aesthetic procedure, accounting for the effect of some important demographic and social characteristics (table 2). For none of the variables, while comparing their categories, significant differences in the mean HRQoL scores were detected. The scores of HRQoL in all the categories of the studied characteristics improved significantly after the aesthetic procedures, except for the Symptoms scale of the categories of Family status and Social status.

We did a stratified analysis to check for the effect of self-rated health and the presence of any depressive disorders on HRQoL before and after the aesthetic treatment. As it was expected, since most of the participants were healthy, they reported high levels of overall health on VAS (Median<sub>T1</sub> = 85; IQR<sub>T1</sub> = 70-95). After the aesthetic treatment, the reported self-rated health improved (Median<sub>T2</sub> = 90; IQR<sub>T2</sub> = 80-95), and the observed changes were statistically significant. The analyses showed no significant differences in the HRQoL scores between the quartiles of self-perceived health (Table 3). All before-after comparisons of the scores on HRQoL scales and total score within each quartile of self-rated health revealed significant enhancement in Functioning, Emotions and overall HRQoL.

**Table 2** HRQoL scores before and after the APby some demographic and social characteristics

Characteristics	HRQoL before AP				HRQoL after AP			
	F	E	S	T	F	E	S	T
<b>Sex</b>								
Male	49.42	60.58	37.69	53.85	32.31**	34.81**	22.31*	33.93**
Female	40.6	50.76	33.70	45.90	29.40**	34.08**	25.43**	32.93**
<b>Age group</b>								
≤ 35 yrs.	44.83	57.25	39.67	51.09	30.92**	34.92**	26.00**	34.04**
35+ yrs.	40.17	48.45	29.31	44.10	29.14**	33.53**	23.45*	32.23**
<b>Education</b>								
≤ 8 yrs.	40.00	35.00	24.74	37.37	35.00	27.50	20.00	32.11
Secondary	49.69	55.94	37.50	52.43	32.66**	33.75**	25.63*	34.14**
Higher	39.88	52.50	34.50	46.29	28.75**	34.75**	24.75**	32.82**
<b>Family status</b>								
Married	32.50	43.28	30.00	38.82	25.47**	31.56**	23.13	29.74**
Cohabitation	43.91	56.88	29.38	48.95	31.41**	36.88**	25.00	34.80**
Single	47.86	57.98	43.33	53.38	32.14**	34.76**	24.76**	34.54**
Divorced	44.50	48.50	30.00	45.47	31.00*	31.00*	28.00	32.21*
Widowed	60.00	58.32	31.15	58.95	32.50**	40.00**	28.38	36.84**
<b>Social status</b>								
Employed	41.41	54.04	34.62	47.69	29.36**	35.38**	25.13*	33.44**
Unemployed	46.82	47.27	35.45	46.89	32.50*	30.91*	25.45	32.63*
Student	44.69	57.81	35.00	50.79	30.94*	34.06*	22.50	33.29*
Pensioner	44.75	46.75	34.00	44.27	32.16*	33.45*	26.35	32.48*

\*- p<0.01 for the before-after comparison in the category  
 \*\*- p<0.01 for the before-after comparison in the category

**Table 3** HRQoL scores before and after the aesthetic procedure by the level of self-rated health and presence of depression (mean scores)

Variables (N)	Before aesthetic procedures				After aesthetic procedures			
	F	E	S	T	F	E	S	T
<b>Self-rated health in quartiles</b>								
0 - Q1 (n=81)	45.26	53.95	37.89	49.47	31.18**	35.66**	23.68*	34.18**
Q1 - Q2 (n=155)	43.91	53.75	31.88	48.42	30.31*	34.69**	26.25	33.49**
Q2 - Q3 (n=122)	36.35	52.31	34.62	44.86	28.08*	32.31**	26.15*	31.98**
Q3 - 100 (n=122)	43.18	50.68	32.73	46.70	30.00*	33.41*	22.73	32.25*
<b>Depressivemood and anhedonia</b>								
Negative (n=434)	40.15	50.85	32.00	45.43	28.95**	33.55**	23.80*	32.25**
Positive (n=46)	55.83	64.44	48.89	60.00^	36.11*	38.06*	30.00*	38.13*

^ - p<0.01 for the comparison between the categories  
 \* - p<0.01 for the before-after comparison in the category  
 \*\* - p<0.01 for the before-after comparison in the category

The screening instrument PHQ-2 detected among the study participants a frequency of depressive mood and anhedonia of 9.58%, which is similar to the frequency of depressive episodes of Bulgarian general population<sup>19</sup>. HRQoL of people determined as test-positive for a depressive disorder was worse in all dimensions and overall than the quality of life of these with test-negative results (Table 3). The observed differences were significant for the total score on HRQoL only. Aesthetic procedures achieved significant improvement in all aspects of HRQoL among patients with and without signs of depression. Despite the fact that at the beginning of the study HRQoL scores were not in favour of participants with a positive test for depressive disorder, that group of patients gained bigger positive effects in all dimensions of quality of life from the aesthetic procedures than the patients without depression. The largest improvement in scores of the depression-positive group was observed for Emotions scale (40.94%) and for Symptoms scale (38.64%). The main group of patients without depression obtained the biggest improvement from the aesthetic treatment in the Emotions domain (34.02%).

**DISCUSSION**

Aesthetic medicine is a relatively new medical specialty and although the interest in the relationship of aesthetic procedures

and quality of life constantly increase, the effects of non-surgical aesthetic interventions on quality of life domains are not fully established yet<sup>10,20</sup>. This study was carried out to explore the effects of patients' HRQoL caused by selected non-invasive and mini-invasive aesthetic interventions. It measured the initial HRQoL of patients visiting centres for aesthetic medicine and assessed the impact of the procedure on three domains - physical and social functioning, emotions and symptoms. We proved that aesthetic problems affect HRQoL mainly through the negative influence on emotions which obtained the highest score for all patients at baseline. Post-procedure scores on emotional well-being showed significant improvement by 35% as compared to the initial ones. These findings correspond to the theoretical framework we employed and support the results reported by others<sup>21-23</sup>.

The positive outcomes of different aesthetic interventions were found to improve several areas of mental health such as anxiety, social phobia, depression, body dysmorphia, goal attainment, life satisfaction, attractiveness, self-efficacy and self-esteem<sup>9,24-26</sup>. Satisfaction with self-appearance and attractiveness are known to influence both the way people think about themselves as well as the behaviour toward others. It is

related to traits such as self-confidence and social acceptance thus having an effect on social functioning as well<sup>27</sup>.

Patients who seek non-surgical aesthetic procedures in most of the cases experience no or mild effect of clinical symptoms, related to their aesthetic problems<sup>28</sup>. The imperfections they have are mainly age-related and rarely are expressed with clinically significant symptoms. Some of patients complain about itching, redness, puffiness but the effect of these symptoms on quality of life rarely is a severe one.

Our study revealed that aesthetic procedures improve immediately the quality of life in all of the three domains in patients, irrespectively of the sex, age, education, family and social status, or level of self-rated health. These results support the findings, reported by several researchers. We did not follow-up the participants further to explore the long-term effects of the aesthetic non-surgical procedure on HRQoL.

Although patients with depressive mood and anhedonia reported diminished HRQoL at the beginning of the study, they improved significantly their quality of life in all the domains after the aesthetic treatment. These observations might partially reflect the effect of aesthetic procedure to improve emotions and parallelly, by interweaving factors and mechanisms, to cause better social functioning. Unfortunately, this study has a limited quality of evidence on that issue due to some limitations. We did not exploit a control group, the period of follow-up was determined by the length of interventions protocols and we could not identify the long-term effects of the aesthetic procedure on HRQoL. We also did not measure the depression after the procedures.

## CONCLUSIONS

Aesthetic non-invasive and micro-invasive procedures have a positive impact on the quality of life of patients. The boosting effect on the appearance is transferred in improved emotional and social functioning, thus affecting positively mental health and the quality of life. HRQoL proved to be a substantial outcome measure in non-surgical aesthetic medicine. It successfully complements the existing measures of clinical outcomes in the field. Measuring HRQoL in non-surgical aesthetic practice has to be introduced as a regular assessment procedure. That will help to manage effectively the comprehensive process of aesthetic treatment and care, taking into account the patient perspective.

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