

The effect of microcurrents on facial wrinkles

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Abstract

Introduction:

Beauty is an important concern of today's people and the facial wrinkles are among these cosmetic problems. Recently, non-invasive treatments such as using microcurrents in treatment of wrinkles and skin renewal have been recommended. This study aimed to determine the effect of micro-current's on the improvement of facial wrinkles.

Materials and Methods:

In this before and after clinical trial, thirty subjects were recruited with three inclusion criteria: having less than 45 years of age, significant facial wrinkles and no other skin problems. Facial wrinkles were treated with micro-currents for twenty minutes for thirty consecutive sessions. Photos were taken from patients' face at the beginning, end and one month after treatment. Three independent and blinded reviewers scored the wrinkles according to the photos.

Results:

The most improvement was seen in the forehead area with about 18.37% in the first step (before and after treatment) and 21.18% in the second step (after treatment and one month later) and the least improvement was observed at the nose and mouth regions (7.61% in first step and 5.85% in second step). The patients' satisfaction about treatment was reported to be over 70%.

Conclusion:

Microcurrents could improve the facial wrinkles and this improvement is more significant at the frontal compared with the nose and mouth areas. Besides, according to the scores given to the photos, immediately after treatment and one month later, not only the effect of treatment was acceptable but also the improvement sustained for at least a month post-treatment.

Keywords: Beauty, Face, Wrinkling, Skin

Introduction:

Beauty is of great concern for contemporary human being and facial wrinkles are

common cosmetic complaints associated with ageing, stress, inappropriate nutrition, smoking, sun exposure, fat deposition and

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inflammatory lesions. Ageing is associated with breakdown of the collagen and elastin components and presentation of apparent ageing marks in the skin. This process is further aggravated by exposure to UV light, gravity, air pollution, smoking, sedentary life, and inappropriate nutrition. With chronicity the epidermis is thinned, and the connective tissue is weakened, the facial muscles become loose, and the epidermis is hung. Meanwhile, the normal wrinkling transforms into abnormal fat deposition in the cheek, chin, and neck. Constriction of the small vessels and reduced circulation result in reduced freshness and darkening of the skin (1,2).

There are many therapeutic approaches for rejuvenation or resolving facial wrinkles. These are classified as invasive, semi-invasive, and non-invasive.

Invasive methods such as skin pulling or other cosmetic surgeries require hospitalization and in addition to costs and convalescent period may be complicated. Of the semi-invasive approaches, the laser therapy is used for resurfacing which not only does need specialist postop care but also requires relatively prolonged convalescent period, complications, and associated expenditures (3). Botulinium (BOTOX) injection is also used for treating wrinkles. However, its inexperienced utilization may result in severe effects and should be administered by a well-trained specialist staff (4).

Non-invasive methods were always appreciated because of fewer complications. For instance, preservative, strengthening, or resolving creams containing antioxidants, vitamin A, hydroxyl acids, alpha lipoic acid,

coenzyme Q-10, copper peptides, growth factors, soya isoflavins, tea concentrates, vitamin C, vitamin E, and collagen are noticeable (5).

Electrical microcurrent is a new non-invasive method. The current is about 1:1,000,000 A. They have been shown to be effective in resistant diabetic ulcer and fractures. This effect is a result of activated biologic system, increased ATP, increased cell proliferation, increased DNA transcription and protein synthesis, proliferation and growth of the stratum corneum, increased blood flow and transportation of the O₂, antioxidants, ions, and nutrients in the epidermis, subcutaneous, lipid layer, and blood and lymph capillaries of the skin. This process results in energy release in the corresponding tissues and inhibits further reduction in elasticity and protein degradation as a consequence of inhibition of free radical formation and enhancing production of collagen type I, II, III (6).

Collagen is the most abundant animal protein (40%) formed from a sheath and a band of fascia. It supports neural tissue, brain, and nervous system and offers a suitable and powerful elastic resistance (7). Collagen also is involved in wound repair in a complex process (8-10). In the maturation and renewal phase, the collagen is deposited along the stretch lines and the redundant cells are removed via phagocytosis in order to leave a healed wound (11).

Electrical microcurrents are free from adverse effects and are used for pain relief, and resistant ulcers or fractures in current clinical practice. The aim of this study was to examine the effects of electrical

microcurrents on the treatment of the facial wrinkles.

Materials and Methods:

In this before-after type clinical trial, volunteer women included after disclosure of the study and acquisition of informed consent. Sampling was based on availability of cases and the sample size was calculated to be 15 according to similar studies and limitations of the current study but 30 participants were included overwhelm the possible fall of during treatment course (12-14).

All individuals underwent photography at the beginning and at the end of the treatment and one month later from right eye and left eye profile views, frontal view, and mouth, nose, and eyes opposite view. Photos were taken by a professional photographer by means of a canon digital camera, 5D, 24105 macro lens, under same light and environmental condition.

Just before the treatment session, the patient was asked to wash her face with soap and clean water and lying supine on a bed. Each side of the face was treated for 10 minutes. The treatment points were frontal area, around eyes, perioral area, cheeks, and chin. The positive electrode was fixed while the negative electrode was sliding toward the positive electrode along the treatment area. For each area, this procedure was repeated five times. The electrodes were two positive and negative bars and covered at their tips by a soft wet textile in order to become conductive.

Treatment course consisted of 30 successive sessions except for holidays, Thursdays, and Fridays.

The device was A6, China, CE certificate from England and Europe currently in market in the northern European countries and United States of America. The currents used in this study were rectangular micro-pulses with the frequency of 70-80 Hz and 0-640 mcA (15-17).

At the end of the treatment course all patients filled up a form assessing satisfaction with the results of treatment, therapeutic center, staff, and environment. This questionnaire was designed based on standard forms and its reliability and validity were calculated to be acceptable (18). The items were based on 5-option Likert's scale and scores 4 or more were regarded as satisfaction. After the clinical conduct, the photographs were coded and sent for assessment by two dermatologists and a plastic surgery fellow and scored from 0 to 10 based on the size, number, and depth of wrinkles. In other words, the scores were based on the effect of wrinkles on the appearance in an individual manner. The judges were blind as to the timing of photographs or the patient's identification. This kind of assessment was used in most of similar studies because of its reliability and validity (19).

The inclusion criteria were age less than 45 years, suffering wrinkles, and the absence of dermatologic disease acknowledged by a dermatologist examination. In case of any complication, the patient was referred to

dermatologist and excluded from the study accordingly. Weight gain in excess of 500 grams was considered an exclusion remark. Patients were not allowed to use anti-wrinkle treatment of any kind and were free to leave the study ad libitum.

Data description was performed via central and peripheral parameters and data analysis was done using student's *t*-test.

We complied with current codes of clinical research by full description of the study goals for each participant and acquired informed consent. On the other hand, microcurrents are common practice in physiotherapy and are universally considered safe. All the photographs were coded and were not identifiable for referees. All the information gathered was kept confidential and the participants were charged nothing for the course of treatment.

Results:

The aim of this before-after study was to evaluate the effects of electrical microcurrents on facial wrinkles conducted over 30 volunteer women resident in Yasouj city and suburbs. The duration of the study was 7 months and it started from November 2010. Only 25 individuals completed the 30 planned sessions and only 19 returned for follow up visit one month later. The age was varied from 25 to 45 years with the mean \pm

SD of 37.5 ± 4.6 . The assessment of the facial wrinkles in frontal area, right and left eye profile, both eyes from opposite view, nose, mouth, and total face implied effectiveness of treatment. Table 1 and figure 1 represent more details.

The rate of improvement in facial wrinkles at the end of treatment was 18 percent for frontal area, 15.6 percent for right eye, 13.5 percent for left eye, 8 percent for nose and perioral area, 11 percent for both eyes from opposite view, and 14 percent for total face ($P < 0.05$). The improvement at the end of the first month after treatment ranged from 4 percent in eyes from opposite view to 21.2 percent for frontal area. The improvements were significant except for eyes from opposite view and mouth and nose area ($P < 0.04$).

Also of interest is that 70 percent of patients were satisfied with their treatment results (see table 2 for details). Although the treatment was satisfactory for patients, they were bothered by the prolongation of the treatment course and also by the length of each session. In decreasing order the most satisfactory results were reported about the softening and smoothness of the skin (89%), skin clearance (79%), and reduction of the depth of the wrinkles (63%). The least satisfaction belonged to the sense of rejuvenation (41%).

Table 1. Comparison between scores and estimates of improvement of wrinkles in participants; stage one (before treatment and after treatment) and stage two (after treatment and one month later)

area	Stage	Before Mean \pm SD	After Mean \pm SD	Number	Stage improvement	Total improvement
Frontal	Stage 1	3.92 \pm 1.80	3.20 \pm 1.55	25	18.37%*	35.46%**
	Stage 2	3.21 \pm 1.59	2.53 \pm 1.68	19	21.18%*	
Right eye profile	Stage 1	3.76 \pm 1.56	3.17 \pm 1.49	25	15.69%*	25.8%**
	Stage 2	3.11 \pm 1.58	2.79 \pm 1.32	19	10.29%*	
Left eye profile	Stage 1	3.56 \pm 1.49	3.08 \pm 1.54	25	13.48%*	19.94%**
	Stage 2	3.07 \pm 1.67	2.81 \pm 1.46	19	8.46%*	
Mouth and nose	Stage 1	3.68 \pm 1.41	3.40 \pm 1.38	25	7.61%*	12.50%**
	Stage 2	3.42 \pm 1.43	3.22 \pm 1.40	19	5.85% ^{NS}	
Eyes from opposite view	Stage 1	3.96 \pm 1.77	3.52 \pm 1.69	25	11.11%*	14.89%**
	Stage 2	3.51 \pm 1.70	3.37 \pm 1.64	19	3.98% ^{NS}	
Face in general	Stage 1	3.78 \pm 1.77	3.27 \pm 1.69	25	13.73%*	22.22%**
	Stage 2	3.25 \pm 1.70	2.94 \pm 1.64	19	10.61%*	

*Significant (P<0.05), **Significant (P<0.001), NS: not significant



Figure 1. wrinkles in one patient: 1. Before treatment. 2. After treatment. 3. One month later.

Table 2. Reported views of the participants regarding the effects of the treatment.

		Mean \pm SD	Other—less than 4	Satisfied—4 or more
1	Are you satisfied with depth of wrinkles?	3.95 \pm 1.05	37%	63%
2	Are you satisfied with length of wrinkles?	3.60 \pm 1.04	50%	50%
3	Are you satisfied with distance of wrinkles?	3.85 \pm 0.74	44%	56%
4	Are you satisfied with clearance of pigmented lesions?	3.90 \pm 0.91	37%	63%
5	Are you satisfied with skin softness in comparison to pre- treatment?	3.45 \pm 1.36	52%	48%
6	Are you satisfied with lightening of your face?	3.95 \pm 0.83	31%	69%
7	Are you satisfied with the resolution of the acne or acne scars?	3.35 \pm 0.87	57%	43%
8	Are you satisfied with the scar clearance?	3.35 \pm 0.87	60%	40%
9	Are you satisfied with closure of the openings in your face?	3.60 \pm 0.82	46%	54%
10	Are you satisfied with softness and smoothness of your skin?	4.30 \pm 0.73	11%	89%
11	Are you satisfied with clearance of your face?	4.20 \pm 0.76	21%	79%
12	How younger do you feel you are?	3.35 \pm 0.74	59%	41%

Discussion:

In this study we evaluated the effects of electrical microcurrents after 30 sessions of treatment on improvement of wrinkles in frontal area, left and right eye profile, both eyes from opposite view, and nose and mouth area and the results demonstrate that the effect was significant. The amount of improvement was more prominent in the frontal area and less noticeable in mouth and nose area which may be attributed to the better handling of the device over the frontal area and more difficult application of the device in the nasolabial area. Furthermore, the structural characteristics of the frontal skin provide better improvement.

In the frontal area, the course of improvement was continued after one month. Also, in the left and right eye profile and eyes from opposite view the effectiveness of treatment was significant at both stages; however, the second stage effectiveness was less prominent. In total, the treatment was effective in both stages.

Comparing the scores immediately after treatment and one month later demonstrates that not only the efficacy of treatment does persist, but also a process of skin rejuvenation and improvement has begun and continued already. Some of our findings are similar to that of Mueller, Lin, Poltawski, and Ghayebi Mehmandost (6, 14, 16, 20).

Conclusion:

It appears that microcurrents cause clearance and lightening of the skin by inducing cell proliferation and renewal and formation of a new layer onto the skin. This is why the participants were satisfied with softness, smoothness, and clearance of their skin (70%).

In some with deeper wrinkles it seems that the result would be even better with more therapeutic sessions. The treatment was satisfactory for patients with respect to skin softness and smoothness, skin clearance, and reduction of the depth of wrinkles. However,

participants were not happy with the length of each session and the prolongation of the treatment course.

Suggestion: Considering the limitations in this study and lack of similar studies at national level, we propose to conduct more studies in this field.

Limitations:

1. Regarding cultural conditions of the state, photography by professional photographers was not possible. Thus, the pictures were taken by the researcher after a course of education. However, the quality of pictures was not desirable.
2. Prolonged treatment course and each session, which could take 40 minutes, caused delay in progression of the study.

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