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Changes in Facial Skin Elasticity and Hydration after Electroacupuncture Pen versus Facial Acupressure, Each Combined with a Honey Mask: A Quasi-Experimental Study

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Abstract

Background: Skin aging is accompanied by reduced facial skin elasticity and hydration, and non-invasive facial treatments are increasingly used to address these changes. **Objective:** This study evaluated changes in facial skin elasticity and hydration after electroacupuncture pen or facial acupressure combined with a honey mask and examined their association before and after intervention. **Method:** This quasi-experimental two-group pretest-posttest study included 60 women aged 30–50 years (30 per group) with non-random allocation. Participants received 24 sessions, three times weekly. Group 1 received 20-minute electroacupuncture pen stimulation followed by a 30-minute honey mask, while Group 2 received 20-minute facial acupressure followed by the same honey mask. No untreated or honey-only control group was included. Outcomes were measured before and after session 24 using a handheld skin analyzer. Paired t-tests assessed within-group changes, Welch's t-test compared change scores between groups exploratorily, and Pearson correlation assessed elasticity-hydration associations. **Results:** Facial skin elasticity increased by 18.90 and 13.73 points in the electroacupuncture pen and acupressure groups, respectively, while hydration increased by 22.67 and 33.43 points (all within-group $p < 0.001$). Exploratory between-group comparisons showed greater elasticity improvement with electroacupuncture (difference 5.17 points; $p < 0.001$) and greater hydration improvement with acupressure (difference 10.76 points; $p < 0.001$). No significant correlations between elasticity and hydration were found before or after intervention in either group (all $p > 0.05$). **Conclusion:** Both interventions significantly improved outcomes. However, between-group differences are exploratory and cannot establish superiority due to non-randomization, shared honey-mask treatment, and no untreated or honey-only control.

Keywords: Electroacupuncture pen, Facial acupressure, Facial skin elasticity, Skin hydration, Honey mask.

Original Research Article

INTRODUCTION

Skin aging is a multifactorial process driven by intrinsic aging and extrinsic exposures such as ultraviolet radiation, pollution, and lifestyle factors (Ahmad & Damayanti, 2018; Sari et al., 2026; Yusharyahya,

2021). Oxidative stress, cellular senescence, and extracellular matrix remodeling reduce collagen and elastin integrity, contributing to wrinkles, laxity, and reduced biomechanical resilience of facial skin (Gu et al., 2020; Shin et al., 2023; Bar & Valiukevičienė, 2025). Skin hydration is a distinct physiological property that primarily reflects water retention and barrier function in the stratum corneum; therefore, elasticity and hydration may change through partly different mechanisms (Park et al., 2024; Shin et al., 2023).

At the tissue level, age-related fragmentation and disorganization of collagen and elastin reduce dermal mechanical support, while changes in epidermal barrier function and natural moisturizing factors contribute to dryness and impaired water retention. Because these processes arise from partly different skin compartments, simultaneous assessment of elasticity and hydration provides a broader description of facial skin condition than either parameter alone and helps explain why improvement in one outcome may not necessarily parallel the other (Dorf & Maciejczyk, 2024; Furman et al., 2025; Park et al., 2024). Non-invasive facial interventions have been investigated as approaches to these age-related changes. In a prospective split-face controlled study, facial neuromuscular electrical stimulation over 8 weeks was associated with improvements in elasticity, wrinkles, and facial contour (Omatsu et al., 2024).

Plant-derived cosmetic ingredients are also being investigated in anti-aging skin care (Xie et al., 2024). Facial acupressure and massage have also been used to provide mechanical stimulation and muscle relaxation, while honey is commonly used as a humectant-containing topical ingredient that can support skin hydration (Ceria et al., 2021; Kurek-Górecka et al., 2020; Soekanto et al., 2022; Soekanto, Tania, Rianti, et al., 2024). Objective hydration measurement is ideally performed with validated instruments such as corneometry or conductance-based probes, because reproducibility differs among devices (Park et al., 2024).

Interest in non-invasive facial stimulation is growing because of its relative ease of use and potential for combination with topical treatments. Soekanto, Tania, Al Aska, et al. (2024) reported increased facial skin hydration after facial acupressure combined with honey, while Soekanto et al. (2025) and Dongke et al. (2025) reported improved skin hydration after honey-based mask interventions. In a prospective split-face controlled study, Omatsu et al. (2024) found improvements in facial elasticity and other aging-related outcomes after facial neuromuscular electrical stimulation. Together, these studies support the plausibility of manual stimulation, electrical stimulation, and honey-based topical care, but they do not establish the independent contribution of each component under the same treatment conditions (Dongke et al., 2025; Omatsu et al., 2024; Soekanto, Tania, Al Aska, et al., 2024; Soekanto et al., 2025).

Honey has humectant and emollient properties that can increase skin surface hydration independently of the stimulation applied. Honey masks have also been studied in other facial-skin contexts (Dongke et al., 2025; Samarghandian et al., 2017; Sinulingga et al., 2018; Umah & Herdanti, 2017). Because the same honey mask was used in both groups, this study cannot isolate the independent effect of honey. The research gap therefore concerns the pre-post response of facial skin elasticity and hydration under two different stimulation components: electroacupuncture pen stimulation and manual facial acupressure when the topical honey component is held constant.

Evidence directly comparing electroacupuncture pen stimulation with facial acupressure under the same honey-mask conditions while assessing both facial skin elasticity and hydration remains limited.

This study compared changes in facial skin elasticity and hydration before and after intervention between the electroacupuncture pen plus honey mask group and the facial acupressure plus honey mask group. The same honey mask was applied to both groups; this comparison primarily reflects differences between stimulation components and cannot isolate the effect of honey. A secondary exploration objective was to examine correlations between elasticity and hydration before and after intervention, as these outcomes represent different skin compartments and may not vary in parallel.

It was hypothesized that both intervention combinations would be associated with improved post-intervention scores, while the magnitude of changes may differ between groups.

This design is exploratory and should be interpreted as a non-randomized comparison of changes associated with the intervention, not as a causal test of treatment superiority.

MATERIALS AND METHODS

Participant flow and the intervention sequence are shown in Figure 1:

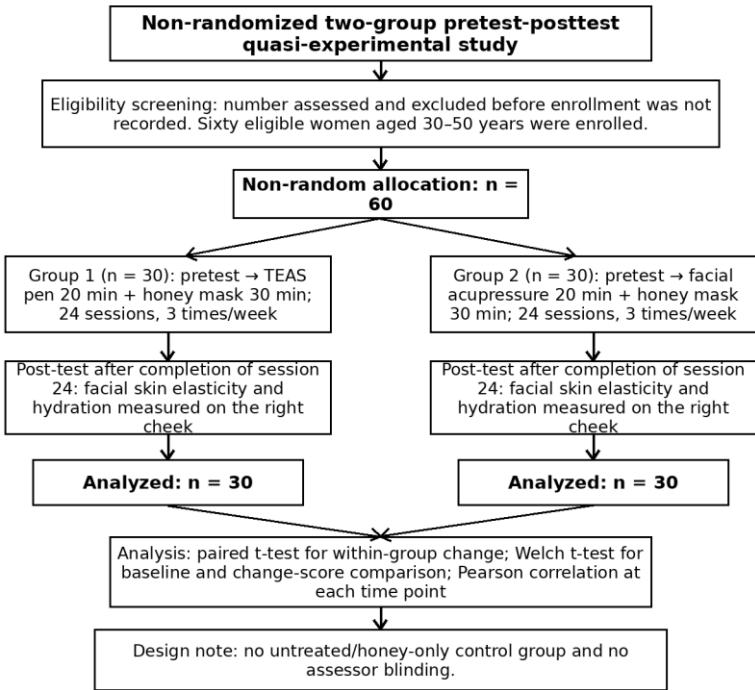


Figure 1. Participant flow and intervention sequence

Study design and participants:

This study used a quasi-experimental, two-group pretest-posttest, non-randomized design and was conducted from March to May 2026 at a polyclinic and doctor's practice in Surabaya. A total of 60 women aged 30–50 years were recruited and non-randomly divided into two groups of 30 participants each. A total of 60 participants were recruited: 57 from general practitioners' practices and 3 from clinics. Twenty-seven percent of general practitioners' practices and 3 from clinics were allocated to the electroacupuncture group (n=30), while 30 from general practitioners' practices were allocated to the acupressure group (n=30). Allocation was non-random and without allocation concealment.

Inclusion criteria were willingness to participate, written informed consent, and no concurrent facial treatment. Exclusion criteria included open wounds, extensive scars, burns, neuromuscular disorders or Bell's palsy, active skin disease, allergy or hypersensitivity to honey, pregnancy, pacemaker or other electronic implants, epilepsy, skin malignancy, and use of retinoids or receipt of fillers, botulinum toxin, laser treatment, or other facial procedures during the preceding 6 months. Potential confounders such as menopausal status, hormone therapy, and smoking were recorded when available; however, a complete baseline-characteristics dataset (e.g., age, BMI, Fitzpatrick skin type, menopausal status, smoking, and sunscreen use) by group was not available for this revision. Baseline (pre-test) elasticity and hydration were compared between groups using Welch's independent t-test (Table 1). Ethical approval was obtained from the Research Ethics Committee of the Faculty of Medicine, Universitas Wijaya Kusuma Surabaya (No. 79/SLE/FK/2026; March 11, 2026), and written informed consent was obtained from all participants.

The intervention consisted of 24 sessions delivered three times weekly over approximately 8 weeks, divided into two 12-session phases separated by a one-week break intended to allow skin recovery and minimize cumulative stimulation. Thus, the overall intervention period was approximately 9 weeks and was completed within the March–May 2026 study period following ethical approval on March 11, 2026. Group 1 received 20 minutes of electroacupuncture pen stimulation, while Group 2 received 20 minutes of facial acupressure; both groups subsequently received the same honey mask for 30 minutes. Pre-test measurements were obtained before the first intervention session, whereas post-test measurements were performed after completion of the 24th session. The exact interval between removal of the final honey mask and post-test measurement was not consistently documented. Detailed records of missed sessions and session-level adherence were also unavailable; however, participant-flow records indicated that all 60 enrolled participants, 30 in each group, were included in the final analysis. No formal a priori sample size calculation was performed; 30 participants per group (total $N = 60$) were enrolled following the common large-sample convention for mean-based inference, and this is acknowledged as a limitation. A sensitivity analysis (two-sided $\alpha = 0.05$, power = 0.80, $n = 30$ per group) indicated that the sample could detect a between-group standardized difference in change scores of $d \geq 0.74$ and a within-group correlation of $|r| \geq 0.49$; weaker correlations could not be reliably detected (Kwak & Kim, 2017; Sidebotham & Hewson, 2025).

Materials:

Group 1 received electroacupuncture using a XINDEFENG DF-618 stimulation pen. The electroacupuncture pen is used because the device delivers electrical stimulation through the skin surface without needle penetration. Before stimulation, the face was cleansed with 70% alcohol. Stimulation was applied bilaterally to ST2 (Sibai), ST3 (Juliao), ST6 (Jiache), LI20 (Yingxiang), and EX-HN5 (Taiyang). The pen tip was applied to each point for approximately 10–15 seconds, with the sequence repeated throughout the 20-minute session; the exact number of completed rounds was not documented. Intensity was adjusted according to participant tolerance. The device uses one 1.5-V AA battery. Frequency (Hz), pulse width, waveform, and current output (mA) were not documented and were not retrospectively estimated; this limits reproducibility (Omatsu et al., 2024; Szmit et al., 2023).

Group 2 received 20 minutes of facial acupressure per session at the same bilateral points: ST2, ST3, ST6, LI20, and EX-HN5. Acupressure was performed manually using the fingertip pads with sequential light pressure and massage, with the point sequence repeated during the 20-minute session. Pressure was adjusted to participant tolerance and reduced or discontinued if discomfort occurred. Numerical pressure and duration at each individual point were not documented. Operators received guidance and training in point identification, sequence, stimulation technique, hygiene, and procedural safety. Reporting of the stimulation sites, technique, duration, frequency, sequence, and operator preparation was organized according to relevant STRICTA reporting principles where information was available.

Outcome measurements: Facial skin elasticity and hydration were measured on the right cheek by the same assessor using a device, Skin Hydration Meter/Skin Moisture Analyzer, which is a handheld digital skin analyzer without a specific brand/model (generic/unbranded OEM; Made in China) as shown in Figure 3. The device measures $125 \times 32 \times 22$ mm, uses a 3.7 V 250 mAh rechargeable battery, has an LCD display, and lists CE, FCC, and RoHS compliance on the label. The device can display skin hydration parameters, oil content, elasticity, and detect environmental temperature and humidity.

Skin hydration measurement is based on the skin's electrical response to water content in the stratum corneum using a sensor on the probe tip. Higher water content in the outermost layer of the skin will affect the electrical properties of the skin and is then converted by the device into a water percentage value, so it is not referred to as body bioelectrical impedance analysis (BIA), but rather as a measurement of the skin's electrical response/capacitance to estimate skin surface hydration. The device also has a sensor for oil/sebum measurement and additional features such as detection of ambient temperature and humidity. The elasticity value is the value displayed by the device and is used as a parameter of elasticity in research; the internal algorithm used by the device to generate this value

is not detailed in the manual and therefore should not be interpreted as a direct measurement equivalent to the Cutometer.

The device displays device-derived percentage values for elasticity and hydration, together with oil content and skin temperature; only elasticity and hydration were analyzed. The same cheek and measurement location were used at pretest and post-test. Calibration records, reliability data, and validation against reference instruments such as a Cutometer or Corneometer were not available for this device. Room acclimatization, temperature and humidity control, time-of-day standardization, repeat-reading protocols, and the exact interval after the final mask were also not available. Accordingly, results are interpreted as comparative device measurements rather than reference-standard biophysical measurements. Elasticity was analyzed as a continuous value; low/moderate/high categories were not used.



Figure 2. Electro acupuncture pen type DF-618 (XINDEFENG)



Figure 3. A. Handheld skin analyzer used to measure facial skin elasticity and hydration

Honey mask procedure: After electroacupuncture pen stimulation or acupressure, the face was cleansed with a cleanser and rinsed with clean water. Approximately 10 mL of honey was applied evenly with a brush while avoiding the eyes, mouth, and nose, and then covered with a moistened tissue for 30 minutes. The same honey preparation and duration of application were used in both groups. The products used were HDI Naturals Clover Honey with a composition of 99.7% Clover Honey and 0.3% Added Bee Collected Pollen, is a Product of New Zealand produced by Midlands Apiaries Ltd. at 8 JB Cullen Drive, Ashburton, NZ for HDI Nutrients Inc., Chandler, AZ 85226, USA and imported by PT. Harmoni Dinamik Indonesia Jakarta. Its batch number, physicochemical characteristics, and formal quality standards were not documented, and the use of a single batch throughout the study could not be confirmed. The method used to remove the mask after 30 minutes was also not documented. In addition, the moistened tissue itself may have contributed to short-term skin hydration (Azizi et al., 2022; Kurek-Górecka et al., 2020; Sinulingga et al., 2018).

Statistical analysis: IBM SPSS Statistics version 27 was used with a two-sided significance level of 0.05. Normality of the paired difference scores (post-test minus pre-test) in each group was assessed using the Shapiro–Wilk test. Baseline values and change scores were compared between groups using Welch’s independent t-test, which does not assume equal variances. Pre-post changes in facial skin elasticity and hydration within groups were assessed using paired t-tests, with mean differences (post-test minus pre-test), 95% confidence intervals, t-statistics, degrees of freedom, and two-sided p-values reported. Pearson correlation was used to evaluate the linear relationship between facial skin elasticity and hydration at the pre-intervention and post-intervention measurements in each group. Effect sizes were expressed as Cohen’s d_z ($t/\sqrt{n}$) for paired comparisons and Hedges’ g for between-group

comparisons. Because allocation was non-randomized and baseline hydration differed between groups, between-group comparisons were treated as exploratory and were not baseline-adjusted.

RESULTS

Statistical analyses were performed using IBM SPSS Statistics version 27 with a two-sided significance level of $\alpha = 0.05$. Pre-test and post-test values by group, together with the baseline comparison, are presented in Table 1. The normality of the paired difference scores (Shapiro–Wilk) is reported in the note to Table 3.

Table 1. Pre-test and post-test facial skin elasticity and hydration (%) by group

Variables	Group	Pre-test, mean $\pm$ SD	Post-test, mean $\pm$ SD
Elasticity (%)	Electroacupuncture pen	51.90 $\pm$ 4.94	70.80 $\pm$ 6.39
	Acupressure	51.33 $\pm$ 3.80	65.07 $\pm$ 5.05
Hydration (%)	Electroacupuncture pen	32.13 $\pm$ 5.14	54.80 $\pm$ 3.96
	Acupressure	25.73 $\pm$ 4.18	59.17 $\pm$ 2.83

Note: Values are device-derived percentages. Baseline comparison between groups (Welch's t-test): elasticity, $p = 0.621$; hydration, $p < 0.001$.

Table 1 shows that baseline hydration was higher in the electroacupuncture pen group than in the acupressure group (32.13% vs 25.73%; $p < 0.001$), whereas baseline elasticity was comparable between groups ($p = 0.621$). This baseline imbalance was considered when interpreting between-group differences in change scores.

Table 2. Between-group comparison of change scores (post-test minus pre-test, %) using welch's t-test

Variables (%)	Electroacupuncture pen change, mean $\pm$ SD	Acupressure change, mean $\pm$ SD	Difference (95% CI)	Welch t	df; p value	Hedges' g
Elasticity	18.90 $\pm$ 4.14	13.73 $\pm$ 5.16	5.17 (2.75 to 7.59)	4.28	55.4; <0.001	1.09
Hydration	22.67 $\pm$ 5.90	33.43 $\pm$ 4.85	-10.76 (-13.56 to -7.96)	-7.71	55.9; <0.001	-1.97

Note: Difference = electroacupuncture pen minus acupressure. SDs of change scores were derived from the paired t-statistics ($SD = |\text{mean change}| \times \sqrt{n} / |t|$). The comparison is exploratory and not adjusted for baseline values.

Table 2 shows that the mean elasticity gain was 5.17 percentage points larger in the electroacupuncture pen group (95% CI 2.75 to 7.59; Welch $t(55.4) = 4.28$; $p < 0.001$; $g = 1.09$), whereas the mean hydration gain was 10.76 percentage points larger in the acupressure group (95% CI 7.96 to 13.56; Welch $t(55.9) = 7.71$; $p < 0.001$; $g = 1.97$). Because the acupressure group had lower baseline hydration, part of its larger hydration gain may reflect regression toward the mean.

Table 3. Paired t-test results for pre-test and post-test measurements in each intervention group

Variables	Group	Mean difference (Post–Pre), %	95% CI	t (df)	p value	Cohen's dz
Elasticity	Electro acupuncture pen	18.90	17.35 to 20.45	25.013 (29)	<0.001	4.57
Elasticity	Acupressure	13.73	11.81 to 15.66	14.580 (29)	<0.001	2.66
Hydration	Electro acupuncture pen	22.67	20.46 to 24.87	21.030 (29)	<0.001	3.84

Variables	Group	Mean difference (Post–Pre), %	95% CI	t (df)	p value	Cohen’s dz
Hydration	Acupressure	33.43	31.62 to 35.25	37.724 (29)	<0.001	6.89

Note: Mean differences were calculated as post-test minus pre-test; positive values indicate higher post-test scores. Cohen’s $d_z = t/\sqrt{n}$. Shapiro–Wilk test of the paired difference scores: elasticity, $p = 0.200$ (electroacupuncture pen) and $p = 0.200$ (acupressure); hydration, $p = 0.200$ and $p = 0.123$. All p values are two-tailed.

Table 3 presents the paired t -test results for each intervention group. Elasticity increased by a mean of 18.90 percentage points in the electroacupuncture pen group (95% CI 17.35 to 20.45; $t(29) = 25.01$; $p < 0.001$; $d_z = 4.57$) and by 13.73 percentage points in the acupressure group (95% CI 11.81 to 15.66; $t(29) = 14.58$; $p < 0.001$; $d_z = 2.66$). Hydration increased by 22.67 percentage points (95% CI 20.46 to 24.87; $t(29) = 21.03$; $p < 0.001$; $d_z = 3.84$) and 33.43 percentage points (95% CI 31.62 to 35.25; $t(29) = 37.72$; $p < 0.001$; $d_z = 6.89$), respectively. These tests describe within-group changes; the between-group comparison of change scores is presented in Table 2.

Table 4. Pearson correlation test results on electroacupuncture pen and acupressure before and after treatment

Treatment group	N	r	P value	95% CI
Electroacupuncture pen before	30	0.177	0.350	–0.196–0.505
Electroacupuncture pen after	30	0.252	0.179	–0.119–0.561
Acupressure before	30	0.075	0.692	–0.293–0.424
Acupressure after	30	0.306	0.101	–0.061–0.600

Description: r = Pearson correlation coefficient; p = significance value of Pearson correlation test; CI = 95% confidence interval; $p < 0.05$ indicates a statistically significant relationship.

Pearson correlation analysis in Table 4 shows that there is no significant linear relationship between facial skin elasticity and hydration, either before or after treatment. In the electroacupuncture pen group, the correlation before treatment was $r = 0.177$ ($p = 0.350$) and after treatment was $r = 0.252$ ($p = 0.179$), while in the acupressure group, $r = 0.075$ ($p = 0.692$) before treatment and $r = 0.306$ ($p = 0.101$) after treatment. All p values > 0.05 indicate that there is insufficient evidence to state a significant linear relationship between the two variables at each measurement time. The increase in elasticity and hydration after treatment cannot be interpreted as a direct relationship between the two variables.

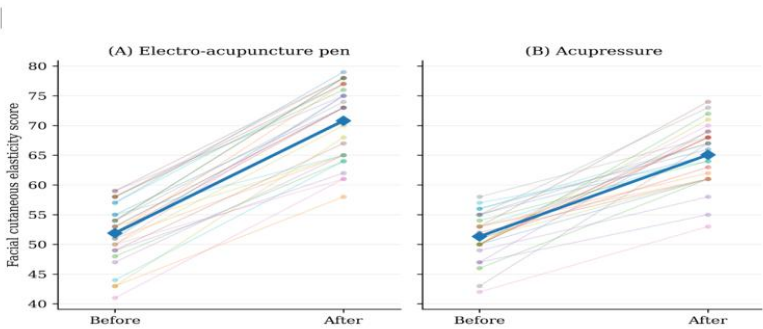


Figure 4. Paired changes in facial skin elasticity before and after the intervention in the electroacupuncture pen and acupressure groups. Thin lines represent individual participants, whereas the thick line with diamond markers represents the group’s meaning.

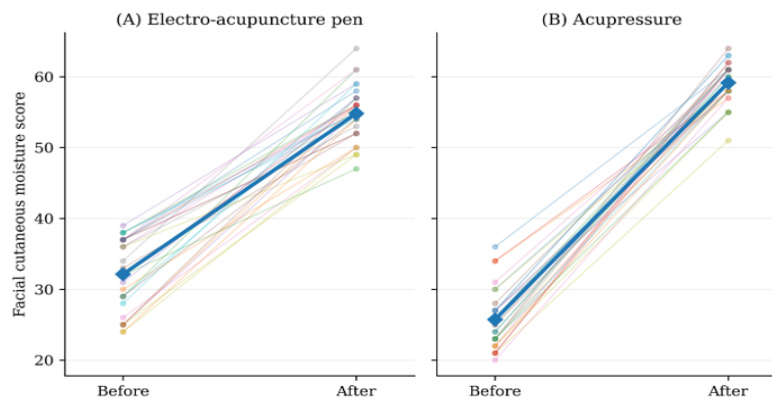


Figure 5. Paired changes in facial skin moisture before and after the intervention in the electroacupuncture pen and acupressure groups. Thin lines represent individual participants, whereas the thick line with diamond markers represents the group's mean.

DISCUSSION

The main finding was that both intervention combinations were associated with substantial pre- and post-intervention improvements in facial skin elasticity and hydration. Numerically, the mean increase in elasticity was 18.90 points in the electroacupuncture pen group and 13.73 points in the acupressure group, while hydration increased by 22.67 and 33.43 points, respectively. In the exploratory Welch comparison of change scores, the elasticity gain was larger in the electroacupuncture pen group (difference 5.17 points; 95% CI 2.75 to 7.59), whereas the hydration gain was larger in the acupressure group (difference 10.76 points; 95% CI 7.96 to 13.56) (Table 2). These results should not be interpreted as evidence that one intervention was superior, especially since allocation was not randomized and there was no untreated or honey-only control group. Shapiro–Wilk testing of the paired difference scores was used to verify the normality assumption of the paired t-test, and Welch's t-test was used for between-group comparisons because it does not require equal variances.

These elasticity findings are directionally consistent with Omatsu et al. (2024), who reported improvements in facial elasticity and other aging-related outcomes after 8 weeks of facial neuromuscular electrical stimulation in a split-face controlled study (Omatsu et al., 2024). This study used the electroacupuncture pen without needle penetration and did not report comparable electrical parameters, so the magnitude of the effects cannot be directly compared. For hydration, previous research by Soekanto, Tania, Al Aska, et al. (2024) found an increase in facial skin moisture after facial acupressure combined with honey, while Dongke et al. (2025) and Sinulingga et al. (2018) reported the hydration benefits of a topical preparation containing honey (Dongke et al., 2025; Sinulingga et al., 2018; Soekanto, Tania, Al Aska, et al., 2024). These findings support the possibility of observed hydration improvements but also reinforce an important design limitation: honey was a common active component in both groups and may have contributed substantially to the hydration changes.

The pattern of results may also reflect the different physiological targets of the two stimulation approaches. Repetitive electrical stimulation may alter facial muscle recruitment and local tissue loading, which could affect elasticity measurements obtained from the device, whereas manual acupressure combines pressure and massage, which may transiently affect superficial circulation and tissue fluid distribution. These mechanisms remain hypothetical in this study because muscle activity, microcirculation, dermal collagen remodeling, transepidermal water loss, and barrier function were not measured. Consequently, the results should be interpreted as changes in measured skin parameters rather than direct evidence that either intervention modifies a specific biological pathway (Omatsu et al., 2024; Park et al., 2024). Biologically, facial elasticity and hydration represent distinct aspects of skin physiology. Elasticity is largely related to the properties of the dermal extracellular

matrix, including the organization of collagen and elastin, while hydration primarily reflects the water content and barrier function of the stratum corneum (Bar & Valiukevičienė, 2025; Park et al., 2024; Shin et al., 2023). Electrical stimulation can affect facial muscle activity and tissue mechanics, while acupressure provides mechanical stimulation and massage. Honey has humectant and emollient properties that can improve surface hydration (Kurek-Górecka et al., 2020).

These physiological differences are consistent with the absence of significant cross-correlations between elasticity and hydration in Table 4. Importantly, the correlation analysis used absolute values at each time point, not change scores, and so cannot determine whether individuals with greater increases in elasticity also experienced greater increases in hydration. Hydration outcomes deserve special attention because the acupressure group had lower baseline mean hydration scores than the electroacupuncture pen group in the available descriptive data. Lower baseline scores provide more room for numerical improvement and may contribute to the greater pre-post changes observed. Furthermore, both groups received the same 30-minute honey mask and moistened tissue after each stimulation session, so some of the observed hydration improvement may be due to the shared topical and occlusive components rather than the stimulation method itself. Although the Welch comparison indicated a larger hydration change in the acupressure group, this analysis was not adjusted for baseline hydration, so part of the difference may reflect regression toward the mean. Future randomized studies with baseline-adjusted analyses would provide a more robust comparison of the two intervention approaches.

The numerical changes were statistically significant, but their clinical significance cannot be established from this study. The minimal clinically important difference for handheld analyzers was not available, and the calibration and validation of the analyzer against a reference standard instrument were not documented. Therefore, changes of approximately 14–19 points in elasticity and 23–33 points in hydration should not be automatically interpreted as clinically significant. Furthermore, the incidence of adverse events, tolerability, and compliance were not systematically reported, making practical recommendations regarding routine use or safety premature. From a clinical perspective, statistical significance alone does not prove a visible or perceived benefit. This study did not include standard wrinkle assessments, photographic assessments, participant satisfaction, or validated patient-reported cosmetic outcomes, and no minimal clinically important difference was available for the handheld analyzer. Future trials would be strengthened by combining validated biophysical measurements with blind photographic assessments and patient-reported outcomes, while also documenting the sustainability of effects after the treatment course ends.

Several limitations should be considered. This study lacked untreated, placebo, and honey-only control groups, limiting separation of the effects of electroacupuncture pen or acupressure from honey and other external factors. Allocation was non-randomized, assessors were not blinded, treatments were conducted at two sites, and baseline hydration differed between groups. Cleansing with 70% alcohol was documented only before electroacupuncture pen, which may have influenced hydration measurements. The handheld analyzer had limited documentation regarding validity and calibration, while environmental conditions and the timing of post-test measurement after the final mask were not fully standardized. Only women aged 30–50 years were included; measurements were taken on one cheek, and several potential confounders were not fully controlled. No formal a priori sample size calculation was performed, and the correlation analysis was powered only to detect moderate-to-strong correlations ($|r| \geq 0.49$). Detailed electroacupuncture pen parameters, acupressure pressure, honey batch characteristics, adherence, missed sessions, and adverse-event data were also unavailable. Although the 24 sessions were divided into two 12-session phases with a one-week break, detailed recruitment dates and the exact interval between the final session and post-test were not documented. These limitations should be considered when interpreting the findings and supporting future randomized studies with appropriate controls, standardized measurements, validated instruments, and complete adherence and safety monitoring.

CONCLUSION

Both the electroacupuncture pen with honey mask and the facial acupressure with honey mask groups showed statistically significant improvements in facial skin elasticity and hydration before and after the intervention. The mean absolute increase in elasticity was 18.90 and 13.73 points, respectively, while hydration increased by 22.67 and 33.43 points, respectively. Exploratory Welch comparisons of change scores favored the electroacupuncture pen for elasticity and facial acupressure for hydration; however, these differences were not baseline-adjusted and do not establish the superiority of either intervention. Pearson correlation analysis showed no significant linear relationship between facial skin elasticity and hydration before or after the intervention in either group. Caution should be exercised in interpretation because allocation was not randomized, there was no untreated or honey-only control group, both groups received the same honey mask components, and outcome assessment was not blinded. Future randomized controlled studies with appropriate control groups, standardized external factors, baseline-adjusted between-group analysis (e.g., ANCOVA), and longer follow-up are needed to more rigorously compare the effectiveness of the interventions.

CONFLICT OF INTEREST

There are no conflicts of interest in this study.

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