DEDICATED TO
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DEPARTMENT OF HEALTHCARE MANAGEMEN

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COSMETIC PROCEDURES – A NECESSARY NEED FOR IMPROVING THE AESTHETIC APPEARANCE OF MATURE INDIVIDUALS

ABSTRACT

Author's abstract of a dissertation for awarding the educational and scientific degree of
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Doctoral Program: "Health Care Management"
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*I dedicate this work to my **granddaughter Gergana**, my little great inspiration – with the hope that she will grow up in a world where the pursuit of beauty is born from the harmony between knowledge, kindness, and inner light!*

The dissertation consists of 147 standard typed pages, illustrated with 25 tables, 25 figures, and 3 appendices. The bibliography includes 229 sources, 9 in Cyrillic and 220 in Latin script.

The dissertation was discussed on October 28, 2025, at an extended meeting of the Departmental Council of the Department of Health Care Management, Faculty of Public Health, Medical University – Plovdiv, and was submitted for defense before a Scientific Jury.

The public defense will take place on February 16, 2026, at 11:00 a.m. in II auditorium of the Lecture Complex of MU – Plovdiv, in accordance with the Regulations for the acquisition of the scientific degree "Doctor" at MU – Plovdiv and based on Order No. P-6667 from 27.11.2025 issued by the Rector of MU – Plovdiv before a **Scientific Jury** composed of:

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Materials related to the dissertation defense are available at the Scientific Department of the Medical University – Plovdiv, 15A Vasil Aprilov Blvd., and on the university website: https://mu-plovdiv.bg

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ABBREVIATIONS AND SYMBOLS USED IN THE DISSERTATION

GAIS – Global Aesthetic Improvement Scale
SPF – sun protection factor
MMT – manual muscle testing
RF – radio frequency

INTRODUCTION

The increased life expectancy and improved living standards in modern society, along with the emergence of an aging population, have led to growing interest in the topic of aging. Beyond a certain age, people seek not only health and vitality but also improvement in their appearance. Health, youth, and beauty have been humanity's dream and desire since ancient times. This pursuit drives the rapid development of science and technology in cosmetology.

Over the past decade, the number of cosmetic procedures performed worldwide has increased. About one-third of those undergoing cosmetic procedures are under 35, but the main consumers are mature individuals over 45.

The desire to slow biological aging and conceal premature aging signs leads to the use of various aesthetic procedures.

Currently, anti-aging cosmetic procedures rely on active substances (e.g., retinoids, ceramides, isoflavonoids); manual techniques such as massage and facial exercises; and cosmetic devices emitting physical stimuli (e.g., ultrasound, electromagnetic waves, infrared radiation), without invasive techniques. Non-medical cosmetic procedures aim to prevent skin changes, treat various skin conditions (dry, oily, sensitive), and address imperfections (pigmentation, scars, capillaries, wrinkles). They are preferred due to their variety and minimal or absent recovery time. Advances in physiotherapy and cosmetology make treatments increasingly effective, achieving results once possible only through aesthetic medicine.

Given the aging population and the growing emphasis on youthfulness, aging becomes a relevant issue. Therefore, we decided to examine facial skin aging processes, contributing factors, and procedures that can improve the aesthetic appearance of mature individuals.

II. WORKING HYPOTHESIS

Our research allows us to formulate the following working hypothesis:

The selection and application of kinesitherapy and cosmetic care procedures for mature clients, based on functional analysis of facial muscles and detailed skin assessment, will lead to positive therapeutic outcomes and improved aesthetic appearance.

OBJECTIVES AND TASKS

Objective:

To monitor the effect of two cosmetic care programs involving radiofrequency lifting and kinesitherapy for facial muscles in mature clients, aiming to improve their aesthetic appearance.

Tasks:

1.To select participants and divide them into experimental and control groups.

2. To conduct detailed skin assessments using Bankov's facial muscle strength test and Glogau's skin aging scale.

3. To develop and apply two cosmetic care programs:

a. Program 1: facial muscle exercises + radiofrequency therapy

b. Program 2: radiofrequency therapy only

3. To monitor the impact of both programs through comparative analysis.

4. Based on results, to formulate conclusions and identify scientific contributions.

IV. CLIENT CONTINGENT. CHARACTERISTICS

Primary data was collected by the author between November 2021 and November 2023. Participants were mainly from Plovdiv. Testing was conducted at the RA DERM Aesthetic Center. The study was prospective (6 months), with a sample-based design.

100 participants were initially studied, divided into equal experimental and control groups, matched by age and gender. The experimental group received facial exercises and radiofrequency lifting; the control group received radiofrequency lifting only.

Assessments included age, gender, facial muscle strength (Bankov), photoaging (Glogau), and skin turgor. GAIS was applied after the 8th procedure. At 6 months, age, gender, and clinical signs were reassessed.

Inclusion criteria:

1. Signed informed consent;
2. Age from 45 to 70 years;
3. Absence of metal prostheses or pacemaker in the patient's body;
4. Absence of active skin allergies;

5. Absence of open or unhealed fresh wounds;

6. Absence of infectious skin diseases;

7. Absence of malignant skin diseases;

8. Absence of dermatological interventions such as laser treatment, injection of dermal fillers and botulinum toxin in the facial area in the last 3 to 5 years;

9. Absence of surgical interventions (plastic surgeries);

10. Absence of diabetes;

11. Absence of residual neurological symptoms - motor, sensory;

12. Absence of accompanying psychiatric diseases for the purpose of better assistance.

Participants were selected based on presentation at RA DERM and meeting the criteria.

IV. 1. Demographic characteristics of participants

Age

The average age of the participants in the experimental and control groups at the start of the study was 54.09 ± 6.423 years, with the youngest being 45 years old and the oldest being 68 years old.

The average age of the participants in the experimental group at the beginning of the observation was 53.54 ± 6.762 years, and that of the control group at the beginning of the observation was 54.64 ± 6.084 years.

There was no statistically significant difference in the age of the participants in the control and experimental groups at the beginning of the study – P = 0.256.

In terms of age intervals, participants aged up to 49 years accounted for the largest share of the experimental group at the beginning of the observation (40%), followed by the 50–59 age group (34%), and the smallest proportion was in the over 59 age group (26%) (Table.1 and Fig. 1).

Table 1. *Age distribution of participants in the experimental group at the beginning of the observation*

Age range	**Count n**	p%
≤49	20	40,00
50–59	17	34,00
≥ 59	13	26,00
Total	50	100,00

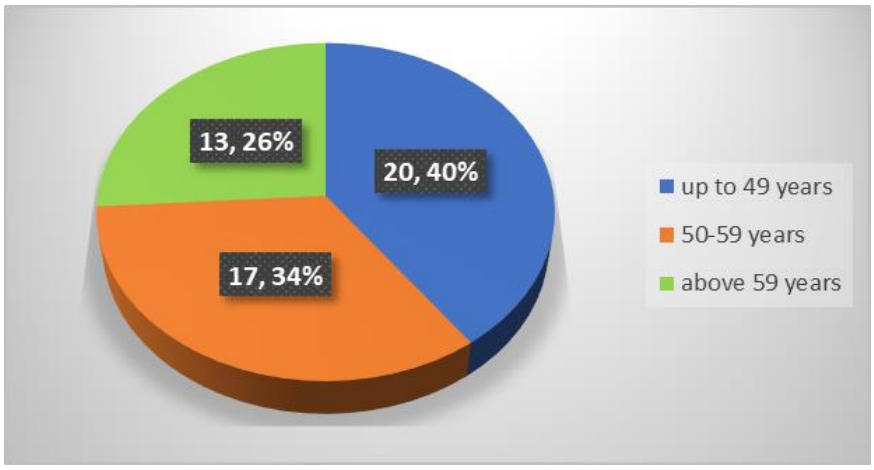

Fig. 1.Age distribution of participants in the experimental group at the beginning of the observation

At the end of the study (after 6 months), 68 participants with an average age of 53.91 ± 5.932 years were tested.

The average age of the participants in the experimental group at the end of the study was 53.49 ± 6.278 years, and the average age of the participants in the control group at the end of the study was 54.48 ± 5.488 years.

In terms of age intervals in the experimental group at the end of the observation, the largest share was occupied by participants from the group up to 49 years of age (38.46%), followed by the group aged 50–59 years (35.90%), and the smallest share was occupied by the group over 59 years of age (25.64%) (Table 2 and Fig. 2).

Table 2. *Age distribution of participants in the experimental group at the end of the observation period*

Age intervals	n	%
Up to 49 years	15	38,46
50–59 years	14	35,90
above 59 r.	10	25,64
Total	39	100,00

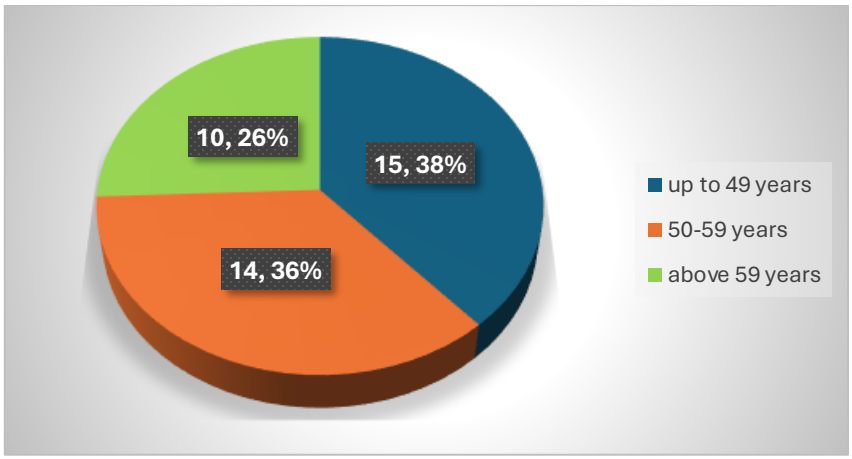

Fig. 2. *Age distribution of participants in the experimental group at the end of the observation period*

No statistically significant difference was found in the age of participants in the control and experimental groups at the end of the study – P = 0.329.

There was no statistically significant difference in the average age of participants at the beginning (54.09 ± 6.423 years) and at the end (53.91 ± 5.932 years) – P = 0.990.

Gender

At the initial stage of the study, 72 women (72.00%) and 28 men (28.00%) participated (Fig. 3).

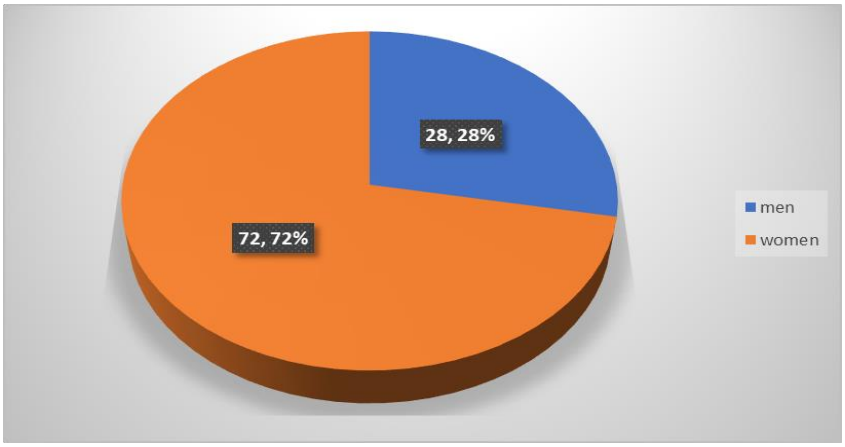

Fig. 3. *Distribution by gender at the start of the study*

The gender distribution at the beginning of the observation shows that the

number of women and men is equal in the experimental and control groups (36 women and 14 men) (Table 3).

Table 3. *Gender distribution in the experimental and control groups at the beginning of the study*

	Gender		Total
Groups	Women	Men	
Experimental	36	14	50
Control	36	14	50
Total	72	28	100

There was no difference in gender distribution between the experimental and control groups at the beginning of the study (Table 4).

In the experimental group, no statistically significant difference in gender distribution was found at the beginning and end of the study – P = 0.268.

At the end of the study, 68 participants remained. Of these, 57 (83.82%) were women and 11 (16.18%) were men (Fig. 4).

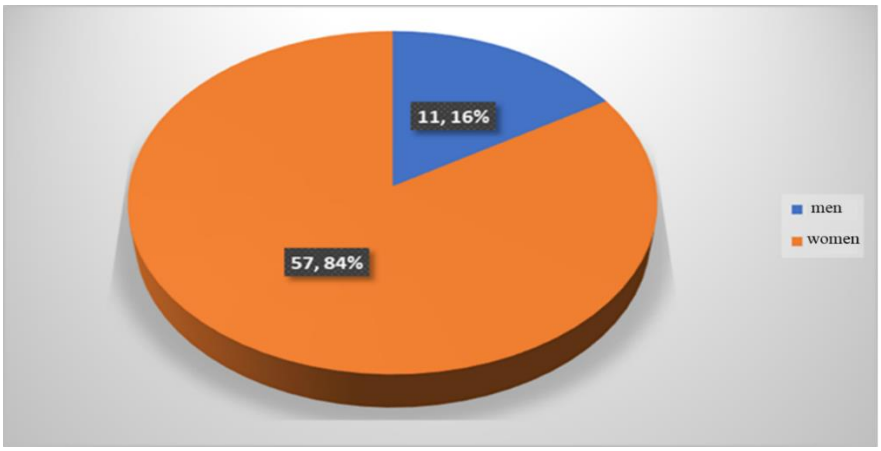

Fig. 4. *Distribution by gender at the end of the study*

Table 4. *Gender distribution in the experimental and control groups at the end of the study*

At the end of study	Gender		Total
Groups	Women	men	
Experimental	32	7	39
Control	25	4	29
Total	57	11	68

There is no statistically significant difference in gender distribution between the experimental and control groups at the end of the study – P = 0.645 (Table 4).

Table 5. *Distribution by gender at the beginning and end of the study*

	Gender		Total
	Women	Men	
At the beginning	72	28	100
At the end	57	11	68

No statistically significant difference was found in the gender distribution at the beginning and end of the study – P = 0.054 (Table 5).

At the end of the study, a total of 32 participants dropped out – 11 from the experimental group and 21 from the control group. Of these, 15 (47%) were women and 17 (53%) were men (Fig. 5). We attribute the reasons for dropping out of the study to weaker motivation to maintain aesthetic appearance in some participants, especially in men.

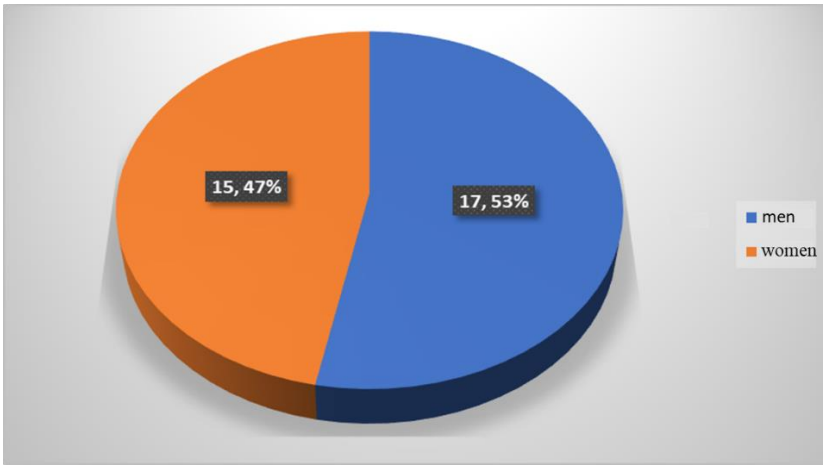

Fig. 5. *Distribution by gender of participants who dropped out of the study*

V. RESEARCH METHODS

To assess the condition of the participants' skin and monitor the effect of the two cosmetic care programs, we used the following research methods:

V.1. Examination of facial skin turgor by palpation

To determine skin turgor, we applied a scale that we modified. The examination consists of pinching a skin fold in the lower third of the face. We observed how many seconds the skin fold remained. If it remains for 1 s, we observe normal density and elasticity; if it remains for up to 2 s, this indicates reduced density and elasticity; if it remains for up to 3 s, we observe significantly reduced density and elasticity.

V.2. Скала на Glogau за фотостареенето оценява степента на стареене на кожата на лицето (табл. 6)

Table 6. *Types of photoaging according to Glogau*

Type	Degree	Age	Wrinkes	Skin condition
I	Mild	28–35	No wrinkes	Early photoaging: slight pigmentation, no keratosis, minimal expression lines, little or no makeup needed.
II	Moderate	35–50	Wrinkles when expressing emotion or movement	Early brown spots visible, palpable keratosis, smile lines begin to appear, light foundation may be used.
III	Advanced	50–60	Wrinkles at rest	Advanced photoaging, visible discoloration, telangiectasia, visible keratosis, heavier makeup needed.
IV	Severe	60–70	Deep wrinkles	Severe photoaging, yellow-gray skin color, possible malignant skin diseases, wrinkles everywhere—no normal skin, cannot wear makeup because foundation cracks.

V.3. Global Aesthetic Improvement Scale (GAIS)

The scale is widely used in the practice of skin diseases and skin aging. It was published in 2003.

It was developed for the purposes of a clinical trial comparing non-animal stabilized hyaluronic acid with bovine collagen for the correction of nasolabial folds. It is also used in other cosmetic treatments or surgeries, such as facial rejuvenation or skin tightening, and treatment of scars or hyperpigmentation (Table 7).

Table 7. *Scale for global aesthetic improvement*

Rating	**Grade**	**Description**
1	Significantly improved condition	Excellent corrective result
2	Much improved condition	Noticeable improvement in appearance, but not fully optimal.
3	Improved condition	Improvement in appearance, better than the original condition, but correction is recommended.
4	Unchanged condition	Appearance is essentially unchanged compared to the initial condition..
5	Deteriorated condition	Appearance has deteriorated compared to the initial condition.

V.4. Test for assessing facial muscles through manual muscle testing (MMT) according to Bankov (Table 8)

Table 8. *Manual muscle testing according to Bankov*

Rating	**Degree**	**Description**
3	Normal	Full range of motion muscle contraction
2	Weak	Visible muscle contraction with incomplete range of motion
1	Trace	Muscle twitching
0	Zero	No movement observed

Testing of m. frontalis, m. corrugator supercilii, m. orbicularis oculi, m. zygomaticus, orbicularis oris, levator anguli oris, quadratus labii superioris, and platysma muscles is performed in a well-lit room with an air temperature of 22–23 °C and with the muscles as relaxed as possible.

To test m. frontalis, we ask the participant to raise their eyebrows. To test m. corrugator supercilii, we ask the participant to bring their eyebrows together. We test the orbicularis oculi muscle by asking the participant to squeeze their eyes shut tightly. We test the zygomaticus muscle by asking the participant to smile happily, pulling the corners of their mouth back and up. The orbicularis oris muscle is tested by asking the participant to pout their lips forward, like a snout. The levator anguli oris muscle is tested by asking the participant to lift the corners of their mouth upward. To test the m. quadratus labii superioris, the participant must lift and protrude the upper lip. We test the m. platysma by asking the participant to protrude the lower lip forward with the mouth closed.

V.5. Statistical methods

The statistical processing of the research data was performed using the SPSS statistical analysis software package, v.19. The following statistical methods were applied:

- Descriptive analysis – description of the quantitative variables studied. The central tendencies are represented by the mean ($\bar{X}$), standard deviation (STD), mode (Mo), and median (Me).

- Spearman's correlation analysis for rank variables.

- Kolmogorov-Smirnov test for normality of the distribution of the metric variable "age." .

-Nonparametric methods – for analysis of rank values and quantitative values that do not have a normal distribution ("age").-Pearson's chi-square test for analysis of the distribution of nominal variables.

A statistical significance level of $\alpha = 0.05$ was accepted.

Checking the distribution of the variable "age" using the Kolmogorov-Smirnov method showed that it is not normally distributed ($P = 0.014$)

Figure 6 shows the study design.

RESEARCH DESIGN

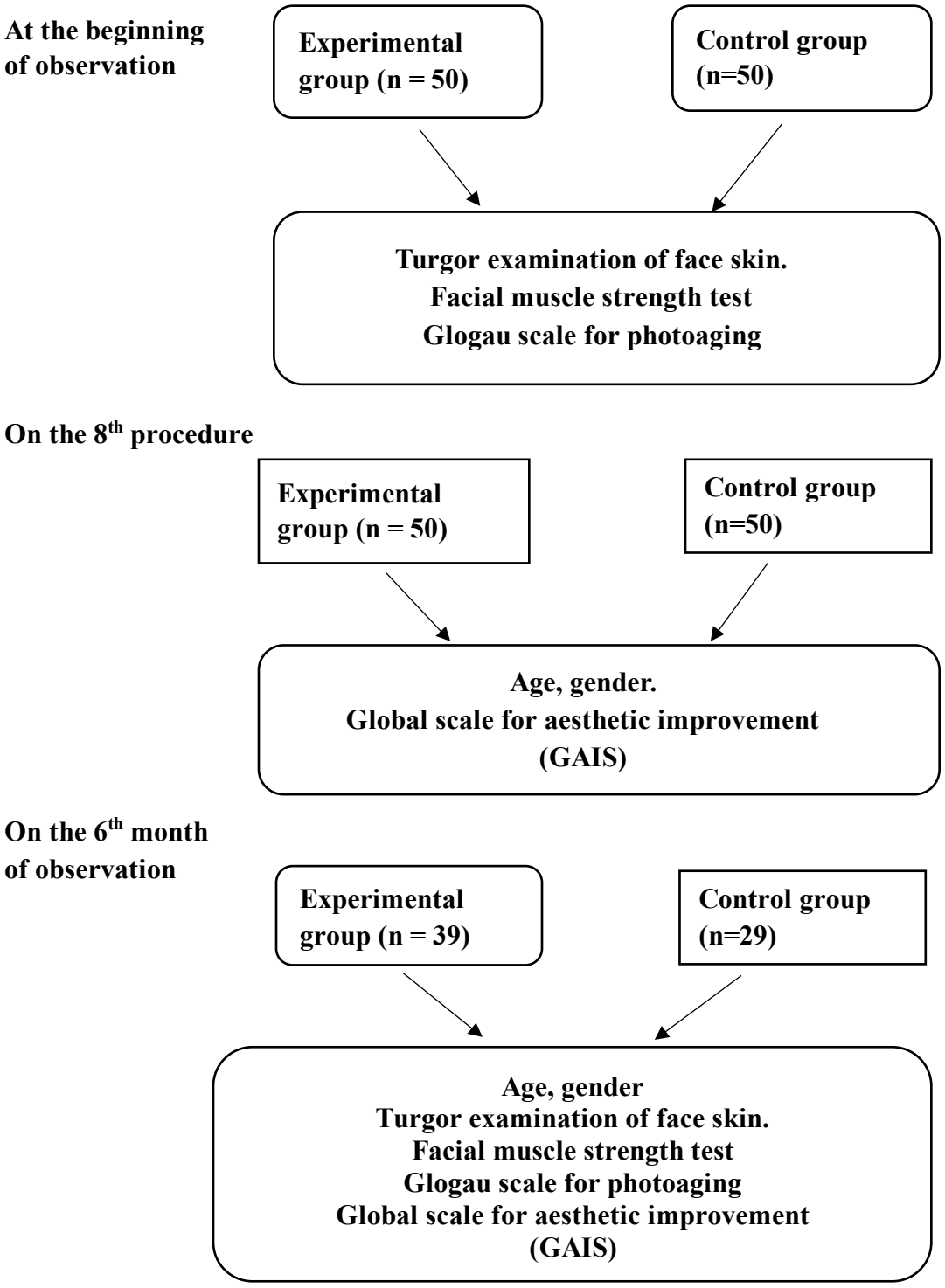

Fig. 8. *Research design*

VI. KINESIOTHERAPEUTIC METHODOLOGY

The objectives of the two cosmetic care programs are as follows:

1. Improving the aesthetic appearance of participants by restoring aspects of the facial contour as much as possible.

2. Correcting and reducing wrinkles by influencing the skin aging processes in the participants in the scientific experiment.

3. Improving the strength of the facial muscles in order to optimize and maintain the functional capabilities of the facial musculature.

4. Improving facial skin trophism by applying radiofrequency lifting to achieve good facial skin turgor.

The **experimental** group of participants underwent a kinesitherapy program for the facial muscles and radiofrequency (RF) lifting of the face and neck area.

The procedure began with a kinesitherapy program that included stretching exercises for m. frontalis, m. corrugator supercilii, m. orbicularis oculi, and m. orbicularis oris, as well as isotonic exercises for m. zygomaticus, m. levator anguli oris, m. quadratus labii superioris, m. quadratus labii inferioris, and m. platysma.

After completing the facial muscle exercises, we apply radiofrequency lifting, working with a unipolar RF tip in the forehead, frown line, crow's feet, oval, cheeks, nasolabial fold, lip contour, chin, and neck areas.

Initially, 8 procedures are performed twice a week, after which the procedures continue four times a month (one procedure per week) in 2 months.

Between the third and sixth months, two procedures are performed each month. Participants in the experimental group are retested after the sixth month.

Participants in the **control** group undergo only radiofrequency (RF) lifting according to the above-described schedule, and participants in this group are retested after the sixth month.

The following algorithm is applied to the participants in the **experimental** group of the cosmetic program:

The workplace is prepared, which includes arranging the necessary products on the work table in the order of their use—a bonnet or hair band, a bowl of cool water, disposable washcloths, towelettes for drying, a brush for applying the products, a product for removing makeup and impurities from the face, contact gel, a final product (cream according to skin type), and cream with SPF 50.

The participant is then positioned on the work couch in the occipital position. The hair is secured with a band or bonnet and a terry cloth or disposable towel is placed on the neckline.

Each cosmetic procedure begins with washing the face to remove makeup, sebum and dust with a product according to the skin type.

Start with the eye contour area, by soaking two cotton swabs with water and part of the cleansing product, place the swabs on the eyes and wait about a minute, then spread the product with light movements, observing the direction of the lines. First, the upper eyelid is cleaned in the direction from the inner corner to the outer corner of the eye and continues in the lower eyelid area to the tear trough. The product is removed with the cleansing towels, with the same hand fixing the outer corner of the eye, and with the other cleaning. The **lip contour area** is cleaned, by applying the cleansing product to the lips with the fingertips. The product is spread with light stroking and rubbing movements from the corners of the mouth to the center of the mouth. The product is removed with the washcloths, with one hand fixing the corner of the mouth, and the direction of cleaning is consistent with the lines of the face - from the corner of the mouth to the center of the mouth. Continue with cleansing **the skin of the face**. Remove impurities from the surface of the skin using a cleansing product, which is applied with the fingers using circular movements along the **cosmetic lines** from the center to the periphery, diagonally upwards (**first cosmetic line** – from the middle of the chin to the earlobe (lobules auriculae); **second cosmetic line** – from the corner of the mouth (commisura labiorum) to the middle of the ear (preauricular area); **third cosmetic line** – from the base of the nose, below the cheekbone to the upper part of the ear; **fourth cosmetic line** – from the middle of the forehead to the temple; **neck line** – from the collarbone (clavicula) to the lower jaw (mandibula) and chin; rinse the product off with lukewarm water and disposable washcloths.

We dry the face and move on to the facial muscle exercises from the physiotherapy program. They are performed from a supine position. This starting position promotes good muscle relaxation. Exercises are performed by manually stretching the frontalis muscle, placing the index and middle fingers on the midline of the forehead, on the left and right sides of the face, respectively.

The middle finger stretches caudally toward the eyebrow, and the index finger stretches cranially toward the hairline (Fig. 7).

Fig. 7. *Stretching of the frontalis muscle*

Stretching of the corrugator supercilii muscle is performed by placing both index fingers at the base of the eyebrows and pulling laterally toward the temple (Fig. 8).

Fig.8. *Stretching of m. corrugator supercilii*

Kinesitherapy continues with stretching of the orbicularis oculi muscle.

Considering that this is the main muscle responsible for the formation of crow's feet wrinkles and its function is to squeeze the eyes tightly, we place our thumb and index finger on the outer corner of the eye to stretch it, moving craniocaudally with the index finger and middle finger, respectively. Work symmetrically on both eyes (Fig. 9).

Fig. 9. *Stretching of m. orbicularis oculi*

The orbicularis oris muscle tends to deepen the wrinkles around the mouth, the so-called "barcode." To stretch it, place your index fingers under the lower lip and your thumbs above the upper lip. Stretch the upper and lower parts of the muscle simultaneously in a lateral direction (Fig. 10).

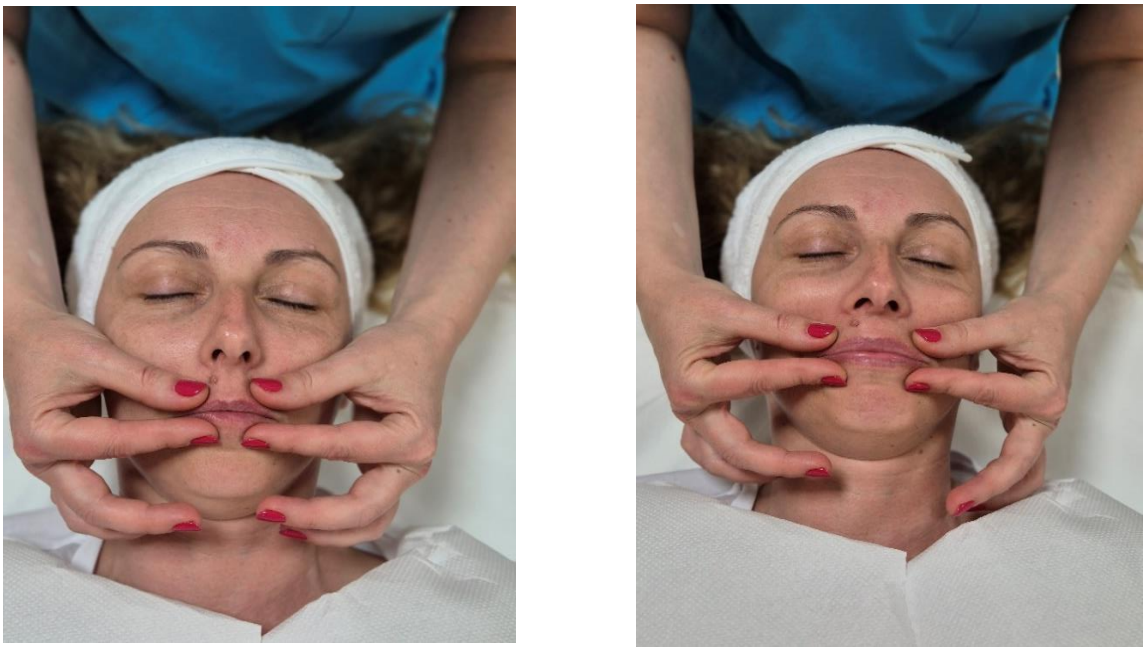

Fig. 10. *Stretching of m. orbicularis oris*

Methodological guidelines. When performing manual stretching exercises, hold the stretched position for 10 seconds, performing 2 sets of 5 repetitions. Progress to 3 sets of 8 repetitions.

For muscles that tend to weaken, we apply exercises in isotonic mode with manual resistance.

To strengthen the zygomaticus muscle, place the index fingers of both hands on either side of the corners of the mouth. The movement is a happy smile with the corners of the mouth pulled laterally. Use your fingers to resist the movement and hold (Fig. 11).

Fig. 1. *Strengthening of m. zygomaticus*

We strengthen the levator anguli oris muscle by asking the patient to lift the corners of their mouth alternately and applying resistance to the movement with our fingers placed above the corners of the mouth (Fig. 12).

Fig. 2. *Strenghtening of m. levator anguli oris*

Next is an exercise to strengthen the m. quadratus labii superior. This exercise is performed by placing the index fingers of both hands above the upper lip. The patient should lift the upper lip, showing their canine teeth (Fig. 13). We apply resistance to the movement and hold.

Fig.13. *Strengthening of m. quadratus labii superior*

With m. platysma, weakening is observed with advancing age. To counteract the gravitational effect on this muscle, we strengthen it by placing the second, third, and fourth fingers respectively on the left and right sides under the mandible in the area of its anatomical location. The patient must tense the submandibular fascia, activating the muscle, while our resistance is reciprocal (Fig. 14).

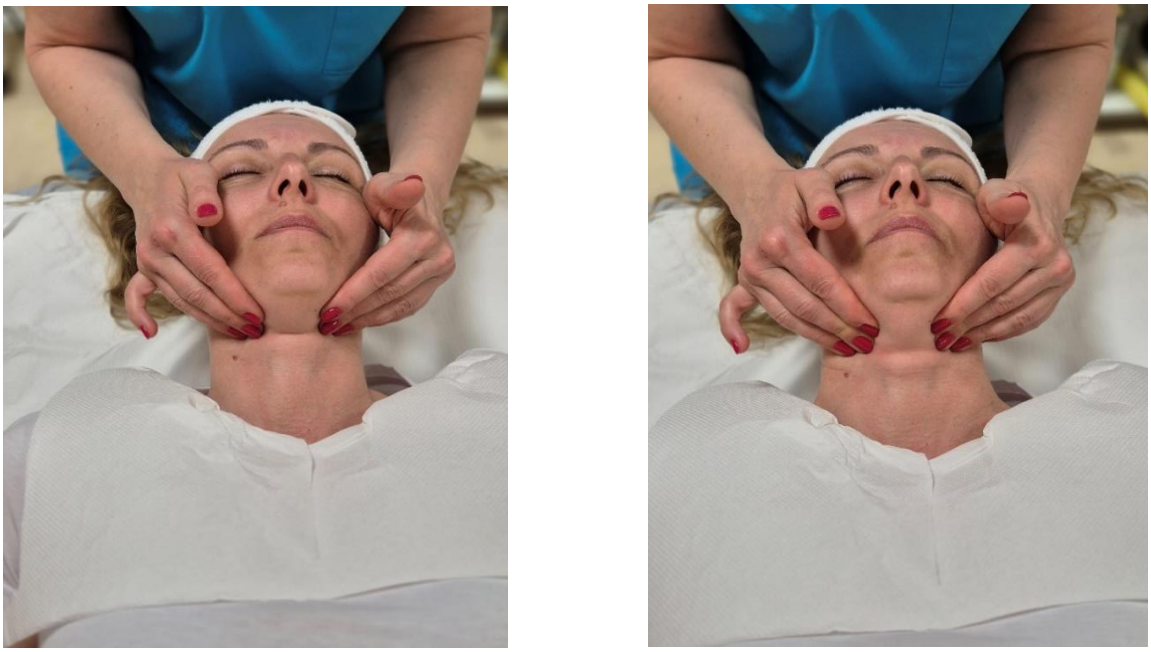

Fig.14. *Strengthening of m. platysma*

Methodological guidelines. When performing isotonic exercises with manual resistance, hold for 5 seconds and perform 5 repetitions. Progress by 3 seconds per 8 repetitions.

After facial exercises, continue with RF lifting (Fig. 15). Apply a contact gel with a layer thickness of about 0.5 cm to the face using a brush. Work with the unipolar tip, which has the following parameters: voltage – 220–240 V, frequency – 50 Hz, power – 150 W, energy – 10 levels. The tip is moved in straight or spiral movements, starting from the forehead area, the frown line between the eyebrows follows the oval of the face, cheeks, nasolabial folds, upper lip, lower jaw, and neck, and then we return to the forehead. We work for 20 minutes at wave intensity level 6. After finishing with the tip, the face is cleaned of the contact gel with washcloths and lukewarm water, dried, and a final cream is applied. After the final cream, a cream with SPF 50 is also applied.

Methodological guidelines. Avoid working with the tip in the thyroid gland area.

***Fig. 3**. Radiofrequency facelift*

The control group does not perform facial muscle exercises. For participants in the control group, we only apply RF lifting, following the same algorithm as for the experimental group.

VII. RESULTS AND ANALYSIS

VII. 1. Analysis of the results by indicators in the experimental group and the control group after the application of radiofrequency lifting and active facial muscle exercises

Comparing the initial and final results of the experimental group and the control group, we found statistically significant differences in the patients from the experimental group in the four indicators studied – skin turgor, photoaging, overall aesthetic improvement, and condition of the facial muscles after radiofrequency lifting and active facial muscle exercises.

VII. 1.1. Skin turgor test results

Table 9 and Figure 16 present the results for the skin turgor assessment between the experimental and control groups at the beginning and end of the study, analyzed using the Mann-Whitney method.

Table 9. *Dependence of skin turgor between the control and experimental groups at the beginning and end of the study*

Indicator	Control group $\bar{X}\pm STD$	Experimental group $\bar{X}\pm STD$	P
Initial assessment of skin turgor	2,16 ± 0,710	2,02 ± 0,769	0,360
Assessment of skin turgor after the 6th month	1,86 ± 0,833	1,23 ± 0,427	**0,001**

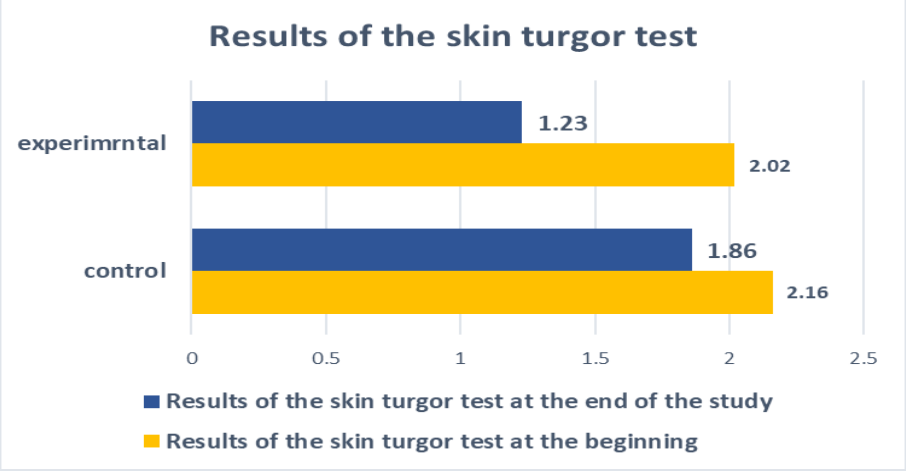

Fig. 16. *Results of the skin turgor test between the control and experimental groups at the beginning and end of the study.*

No statistically significant differences were found between the experimental and control groups at the beginning of the study. At the end of the study, an improvement in this indicator was observed, with normal density and elasticity found in the experimental group.

Based on this indicator, we can conclude that non-invasive cosmetic procedures have a beneficial effect on skin turgor. Our claim is confirmed by a number of studies that examine the use of RF therapy for rejuvenation in removing pigment spots, influencing collagen and elastin fibers, and improving skin elasticity.

VII. 1.2. Results for the "Glogau scale assessment of photoaging" indicator

In our study, we found a statistically significant difference in the photoaging indicator by gender only at the beginning of the study (Table 10).

Table 10. *Dependence of the skin photoaging index and gender at the beginning and end of the study*

Indicator	Men $\bar{X}$±*STD*	Women $\bar{X}$±*STD*	P
Initial assessment on the Glogau scale for photoaging	2,43±0,573	2,90±0,675	**0,001**
Assessment on the Glogau scale for photoaging after 6 months	1,55±0,688	1,81±0,789	0,310

There is no consensus in the literature as to which of the two sexes shows more pronounced signs of photoaging of the skin. Photoaging affects both men and women, but the severity and characteristics of skin changes can vary significantly between the sexes. Women of European descent tend to show more pronounced signs of photoaging than men, while men may experience milder changes in certain ethnic groups, such as Chinese men. The difference between the sexes is in the severity of photoaging. In general, women show more severe signs of photoaging, including deeper wrinkles and more pronounced pigment disorders, especially in European and Northeast Asian populations. There are also environmental factors such as ultraviolet radiation, air pollution, and visible light, which also contribute to photoaging, affecting both sexes.

We can summarize that although photoaging is a universal problem, differences in its manifestation in men and women highlight the need for gender-specific approaches in prevention and treatment strategies.

In our study, we found a high correlation at the beginning of the study between the photoaging index and the age of the participants (Table 11).

Table 11. *Dependence of photoaging indicators and age at the beginning of the study*

Indicators	Correlation coefficient r_s	P
Age – initial assessment on the Glogau scale for photoaging	0,778	**<0,0001**

The impact of age on photoaging involves cumulative effects, and here we must emphasize the severity of the signs of photoaging, such as wrinkles and pigmentation, which increase with age, especially in areas exposed to the sun.

To determine whether there was a statistically significant effect of the procedures performed on patients in the experimental group, we applied Wilcoxon's method for two related samples for the skin photoaging index, comparing the initial assessment with the assessment after six months. We found a statistically significant difference for this indicator (Table 12). We calculated the effect size r, where $r=Z/\sqrt{N}$, N=39, and found it to be much greater than the typical effect size for the indicator studied.

	Initial assessment on the Glogau scale for photoaging. Assessment on the Glogau scale for photoaging after 6 months.
Z r	-5,642 0,90
P (Asymp. Sig. (2-tailed))	**<0,000**

Table 12. *Comparison of statistical data on the photoaging indicator at the initial testing and after six months in the experimental group*

The results give us reason to conclude that there is a significant correlation between the duration of non-invasive aesthetic procedures and wrinkle reduction, as longer treatments usually lead to more pronounced and lasting improvements in skin appearance. Various non-invasive techniques have been proven to effectively treat signs of photoaging, such as fine lines and changes in skin texture. Radiofrequency therapy has been shown to be effective in rejuvenating photoaged skin, with optimal results typically observed 3-6 months after treatment.

At the beginning of the study, no statistically significant differences were found between the experimental and control groups. At the end of the study, we observed a significant improvement in the experimental group, consisting of the appearance of minimal wrinkles during emotional expression.

Table 13 and Figure 17 show the initial and final results for the "Glogau Scale Assessment" indicator in the experimental and control groups.

Table 13. *Dependence of the skin photoaging index on the Glogau scale between the control and experimental groups at the beginning and end of the study (after six months)*

Indicator	Control group X̄±STD	Experimental group X̄±STD	P
Initial assessment on the Glogau scale for photoaging	2,80±0,639	2,74±0,723	0,565
Assessment on the Glogau scale for photoaging after 6 months	2,28±0,797	1,38±0,493	<0,0001

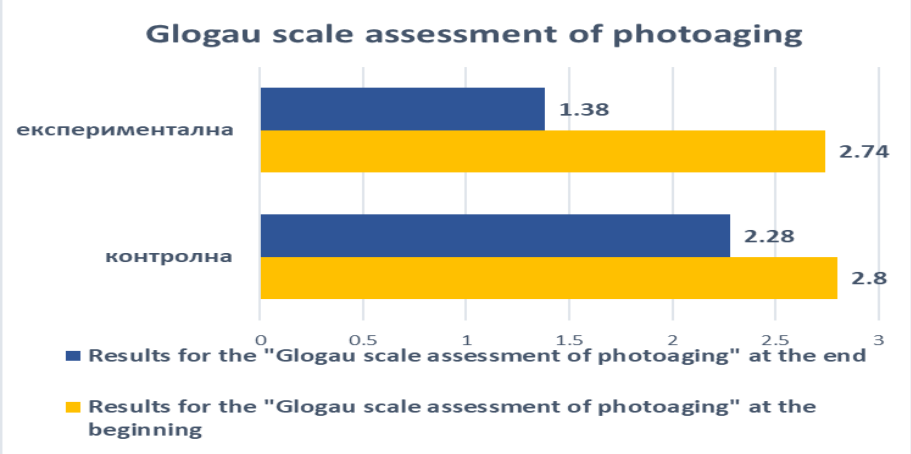

Fig. 17. *Results for the "Glogau scale assessment of photoaging" indicator between the control and experimental groups at the beginning and end of the study*

Analyzing this indicator, we can conclude that the effect of non-invasive aesthetic procedures for reducing photoaging of the skin is significant, as these techniques promote collagen production, improve skin texture, and enhance its elasticity. By applying RF lifting in combination with active facial muscle exercises, we reduced wrinkles at rest, improved the contour, appearance, and natural look of

the participants in the experimental group by influencing the effects caused by photoaging of the skin.

VII. 1.3. Results for the "Overall aesthetic improvement" indicator

When examining the results of the overall aesthetic improvement scale, no correlation was found between the indicators by gender at the beginning of the study and the overall aesthetic improvement scale after the eighth procedure and at the end of the study.

In our study, we found a moderate positive correlation between the "Overall aesthetic improvement after the eighth procedure" indicator and age (Table 14).

Table 14. *Dependence of the age indicator and scale for global aesthetic improvement after the eighth procedure and at the end of the study*

Indicator	Men $\bar{X}$±*STD*	Women $\bar{X}$±*STD*	P
Overall aesthetic improvement after the 8th procedure	2,79±0,686	2,69±0,705	0,744
Overall aesthetic improvement after the 6th month	2,00±1,265	2,14±0,972	0,564

There are a number of studies showing the satisfaction of different age groups of patients with the improvement in their quality of life as a result of non-invasive cosmetic procedures. The communicative and social aspects of life improve in mature patients who undergo non-surgical cosmetic procedures.

To determine whether there was a statistically significant effect of the procedures performed on patients in the experimental group, we applied Wilcoxon's method for two related samples by comparing the global aesthetic improvement score from the eighth procedure with the score after six months. We found statistically significant differences for this indicator. We calculated the effect size r, where $r=Z/\sqrt{N}$ N=39. It was found to be much greater than the typical effect size for the indicator studied. (Table 15).

Table 15. *Comparison of statistical data on the global aesthetic improvement indicator after the eighth procedure and after six months in the experimental group*

	- Overall aesthetic improvement 2nd test after 8th procedure - Overall aesthetic improvement after 6 months
Z r	-5,324 0,85
P (Asymp. Sig. (2-tailed))	**<0,000**

Analyzing the initial and final results of the application of radiofrequency therapy and active gymnastics for the facial muscles, we observe a global aesthetic improvement after the eighth procedure and after the sixth month (P<0.000) (Table 16 and Fig. 18). The application of radiofrequency therapy as a non-invasive treatment improves the aesthetic appearance of the face by affecting skin sagging and fine lines. The therapy works by heating the dermal layers, stimulating collagen production, and promoting skin tightening, leading to significant improvements in facial appearance and contributing to overall aesthetic improvement.

Table 16. *Dependence of the global aesthetic improvement indicator between the control and experimental groups after the eighth procedure and at the end of the study*

Indicator	Control group $\bar{X}\pm STD$	Experimental group $\bar{X}\pm STD$	P
Overall aesthetic improvement after the 8th procedure	3,20±0,404	2,24±0,591	**<0,0001**
Overall aesthetic improvement after the 6th month	3,07±0,593	1,41±0,595	**<0,0001**

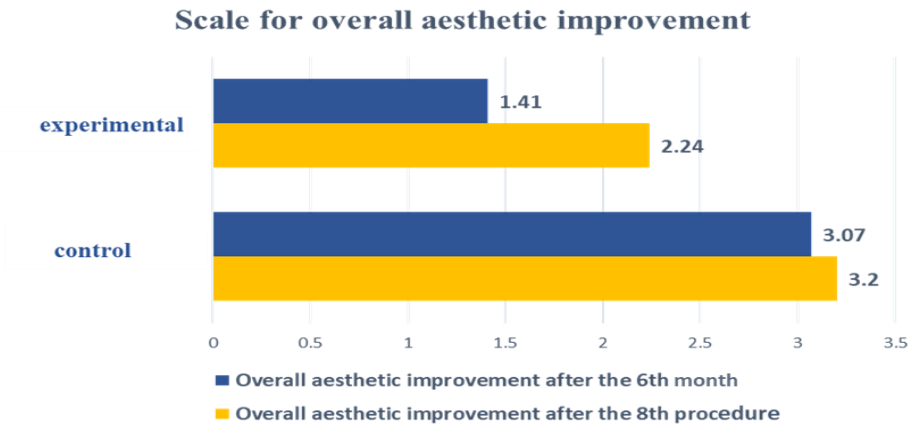

Fig. 18. *Results for the "Overall aesthetic improvement" assessment between the control and experimental groups after the 8th procedure and at the end of the study after the 6th month.*

In conclusion, we can say that the application of non-invasive RF therapy combined with active facial muscle exercises are promising techniques for the overall aesthetic improvement of facial skin. RF therapy stimulates the production of collagen and elastin, which leads to firmer and younger-looking skin, while active muscle exercises help reduce wrinkles and correct the facial contour.

VII. 4. Results for the Manual Muscle Testing indicator

Figure 19 shows the initial and final results for the "Bankov MMT" indicator in the experimental and control groups.

When comparing the MMT results for the facial muscles, we find statistically significant differences in the participants from the experimental group at the beginning of the study and after 6 months in the four muscles, m. zygomaticus, m. levator angulus oris, m. quadratus labii, and m. platysma, which differ statistically significantly from the control group as $P < 0.0001$.

The improvement in aesthetic appearance and smoothing of contours in the experimental group is attributed to the application of RF therapy combined with active gymnastics, which increases the tone of specific facial muscles, leading to improved skin appearance and structural changes in muscle tissue. This synergistic approach not only stimulates the facial muscles, but also promotes the production of collagen and elastin, which are crucial for maintaining skin elasticity. The application of RF therapy combined with active gymnastics has effects on facial muscle tone by increasing muscle mass density.

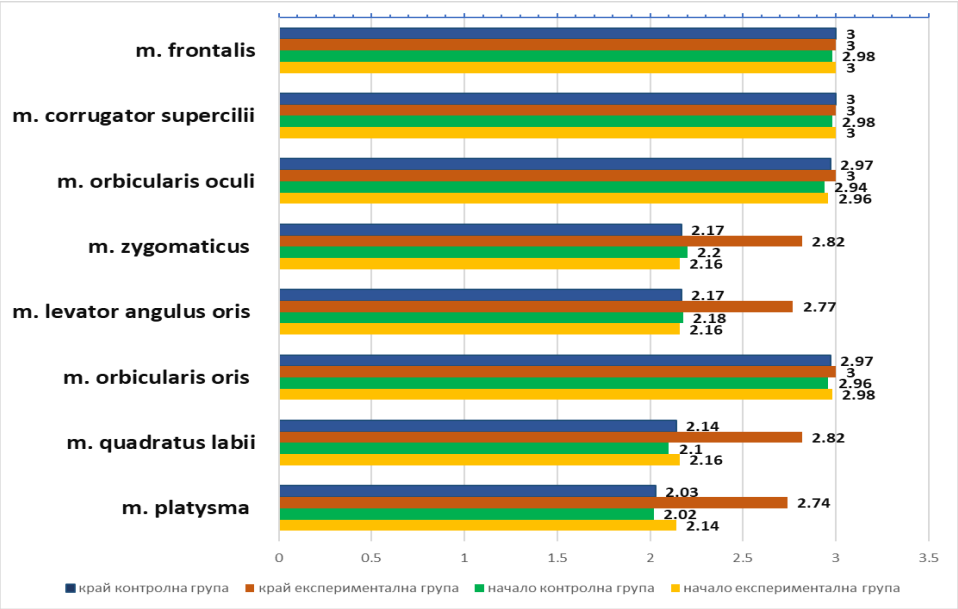

Fig. 19. *Results of the MMT test for facial muscles at the beginning and end of the study between the control and experimental groups at the beginning and end of the study*

VII. 5. Comparison of statistical data on indicators at the initial testing and after six months in the experimental group

To determine whether there is a statistically significant effect of the procedures performed on the participants in the experimental group, we apply Wilcoxon's method for two related samples for each of the three indicators, comparing the initial assessment with the assessment after six months. We find statistically significant differences in the three indicators. We calculate the effect size r, where $r = Z/\sqrt{N}$, $N = 39$. We find a much larger than typical effect size for all indicators (Table 17).

Table 17. *Comparison of statistical data on indicators at initial testing and after six months in the experimental group*

	Initial assessment of skin turgor – Assessment of skin turgor after the 6th month	Initial assessment on the Glogau scale for photoaging – Assessment on the Glogau scale for photoaging after the 6th month	Overall aesthetic improvement 2nd test after the 8th procedure – Overall aesthetic improvement after the 6th month
Z r	-5,324 0,85	-5,642 0,90	-5,324 0,85
P (Asymp. Sig. (2-tailed))	**< 0,000**	**< 0,000**	**< 0,000**

Analysis of the three indicators shows that the application of non-invasive radiofrequency in combination with active facial muscle exercises yields positive results, consisting of a significant improvement in aesthetic appearance by improving the tone of the facial muscles and reducing the signs of aging, which together contribute to a more youthful appearance.

VIII. CONCLUSIONS

Based on the results obtained, the following conclusions can be drawn:

1. The application of radiofrequency lifting and active gymnastics for the facial muscles has a positive effect on the rejuvenation of the facial skin by improving skin turgor. The lack of active gymnastics of the facial muscles is the reason for the lack of improvement in the aesthetic appearance of the participants in the control group.

2. As a result of the non-invasive procedures applied, including radiofrequency lifting and kinesitherapy for the mimic muscles, a positive effect was observed in the participants from the experimental group in terms of smoothing the facial contour and reducing wrinkles.

3. Exercises for the facial muscles improved skin laxity and muscle thickness, improved facial muscle tone, and reduced visible signs of aging, with improved skin condition observed in the participants in the experimental group who underwent consecutive non-invasive procedures.

4. The relationship between the duration of non-invasive aesthetic procedures and wrinkle reduction is significant, as longer-term treatment usually leads to more pronounced and lasting improvements in skin appearance, which we observed at the 6-month mark.

5. We attribute the improvement in aesthetic appearance, smoothing of contours, and reduction of the effects of skin aging in the experimental group to the application of radiofrequency therapy combined with active gymnastics.

6. Age affects the results and severity of signs of photoaging such as wrinkles and pigmentation. With increasing age, the visible signs of skin aging become more pronounced, leading to noticeable changes in the structure and appearance of the facial skin.

7. Gender influences the results of photoaging. Both men and women are affected, but the severity and characteristics of skin changes differ between the sexes. In general, women show more severe signs of photoaging, including deeper wrinkles and more pronounced pigment disorders at an earlier age.

8. Combining radiofrequency therapy and active facial muscle exercises is a safe approach to rejuvenating the skin, increasing facial muscle tone, and improving the quality of facial skin.

IX. CONTRIBUTIONS OF THE DISSERTATION

1. For the first time in Bulgaria, a prospective study was conducted on the effectiveness of radiofrequency lifting combined with active facial muscle exercises.

2. The literature review has a theoretical and practical contribution, as medical cosmetology specialists can use it to develop programs for improving the aesthetic appearance of mature-aged people.

3. A questionnaire has been developed to record specific anamnestic, clinical, and social data for clients with cosmetic problems.

4. A demographic, clinical, and social characterization of the study participants has been carried out, comparing groups with and without active facial muscle exercises.

5. For the first time in Bulgaria, the Glogau scale for photoaging and the Global Aesthetic Improvement Scale (GAIS) were applied, and the results were recorded, analyzed, and discussed in dynamics.

6. For the first time in Bulgaria, correlations in dynamics are tracked from the results of facial skin turgor, the Glogau scale for photoaging, and the Global Aesthetic Improvement Scale (GAIS) with basic demographic and clinical indicators.

7. An effective therapeutic algorithm has been established for improving facial contour and symmetry and creating a good aesthetic appearance through the use of non-invasive procedures.

PUBLICATIONS RELATED TO THE DISSERTATION

1. Pavlova, G., & Becheva, M. (2021). Cosmetic care for mature individuals. Knowledge International Journal. 48(3), 547-552.

2. Pavlova, G. (2024). Changes in facial muscles with advancing age and their impact on the aesthetic appearance of the face. Knowledge International Journal. 62(4), 1-10.

3. Pavlova G. (2025). Improving the condition of photo-damaged skin through radiofrequency therapy. Nursing. 57(2), 55-60

4. Pavlova, G., Becheva, M., Kirkova-Bogdanova, A., Bozhkova, M. (2026). Monitoring the Effect of Noninvasive Cosmetic Procedures on Skin Photoaging. Folia Medica. 68(1).

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