



The impact of microneedle mesotherapy treatment on anti-aging prevention and reduction of skin aging symptoms – subjective evaluation of the effectiveness of the treatment

Wpływ zabiegu mezoterapii mikroigłowej na profilaktykę przeciwstarzeniową oraz zmniejszanie objawów starzenia się skóry – subiektywna ocena efektywności zabiegu

ABSTRACT

The ageing of human facial skin is an inevitable process. With age, wrinkles appear, the skin becomes thinner, there is a decrease in hydration, elasticity and firmness, and a general loss of vitality.

This study aimed to evaluate the effectiveness of microneedle mesotherapy in preventing and reducing the signs of skin ageing in women who underwent a series of microneedle mesotherapy treatments.

Microneedle mesotherapy treatments significantly improve skin tone and firmness, lift the oval of the face, increase skin hydration and reduce wrinkles. In recent years, microneedle mesotherapy has gained increasing interest as a non-invasive and effective method of preventing and reducing the signs of skin ageing.

Keywords: microneedle mesotherapy, micropuncture, regeneration, remodelling, collagen, ageing, wrinkles, anti-ageing therapies

STRESZCZENIE

Starzenie się skóry twarzy człowieka jest procesem nieuniknionym. Wraz z wiekiem pojawiają się zmarszczki, skóra staje się cieńsza, dochodzi do spadku jej nawilżenia, elastyczności i jędrności oraz ogólnej utraty vitalności.

Celem pracy była ocena efektywności zabiegu mezoterapii mikroigłowej w profilaktyce przeciwstarzeniowej oraz w zmniejszaniu objawów starzenia się skóry u kobiet poddanych serii zabiegów mezoterapii mikroigłowej.

Zabiegi mezoterapii mikroigłowej w znaczny sposób wpływają na poprawę napięcia i jędrności skóry, podniesienie owalu twarzy, wzrost nawilżenia skóry oraz spłylenie zmarszczek. W ostatnich latach mezoterapia mikroigłowa zyskuje coraz większe zainteresowanie jako nieinwazyjna i skuteczna metoda w profilaktyce przeciwstarzeniowej oraz w redukcji objawów starzenia się skóry.

Słowa kluczowe: mezoterapia mikroigłowa, mikronakłuwanie, regeneracja, przebudowa, kolagen, starzenie się, zmarszczki, terapie przeciwstarzeniowe

INTRODUCTION

Nowadays, more and more attention is being paid to the appearance of the skin. Both cosmetological and dermatological treatments are becoming popular methods to improve skin condition and reduce existing signs of aging. One of the more popular treatments is micro-needle mesotherapy, described as a method to induce collagen formation. During

the procedure, the skin is subjected to intensive, dense and appropriately deep puncturing with thin needles, resulting in thousands of micro-punctures. As a result of the controlled damage to the skin, micro-bleeding occurs, which activates platelets and initiates a process similar to that which occurs during wound healing. The healing process consists of three



successive phases, which include inflammation, proliferation - characterized by the reproduction of new skin cells, and remodelling - which is the formation of new tissue [1, 2]. Microneedling aims to stimulate the skin's natural potential for biostimulation, revitalization and reconstruction, as well as increase the absorption and effectiveness of therapeutic substances. The natural regenerative mechanisms created during the procedure lead to enhanced skin structure, tone and elasticity, thickening of the epidermis and improvement of its function, as well as an augmented overall external appearance. One of the many indications of micro-needle mesotherapy is anti-ageing prevention and skin rejuvenation [2-5].

MICRO-NEEDLE MESOTHERAPY

Micro-needle mesotherapy stimulates the formation of new collagen fibres in the dermis and promotes renewal and regeneration of the entire epidermis. The microneedling procedure is based on two factors:

- physical - a sting that is a restorative signal,
- pharmacological - deposition of active substances into the treated skin.

The introduction of active substances into the bloodstream results in their distribution and direct effect on the cells of both the dermis and epidermis. In turn, micro-damage of the skin stimulates natural repair mechanisms. As a result, the division of stem cells is activated and their metabolic activity is increased, leading to developed synthesis of collagen, elastin and hyaluronic acid [1].

Micropuncture treatment is performed using: dermarollers, special punches with needles and the currently most popular so-called dermapen. To achieve the desired results, the appropriate length of needles and, consequently, the depth of punctures is important. The use of different puncture depths allows to achieve a variety of therapeutic goals. This is a factor that determines the effectiveness and safety of the treatment. The depth of punctures ranges from 0.15 mm to as much as 3-4 mm. Micropuncture can be divided into superficial and deep. Superficial puncturing facilitates the penetration of active substances deep into the skin, while deep puncturing leads to skin restructuring and increased collagen production [1, 6]. To induce collagen formation, the punctures must be of sufficient depth so that the needles reach the network of blood vessels in the papillary layer in the dermis. Based on the length of the needles and the resulting depth of damage, there are three types of micropuncture: cosmetic, in which the length of the needles ranges from 0.1 to 0.3 mm, medical, during which punctures are made with needles 0.3-2.5 mm long, and surgical with needles 3-4 mm long [4-7].

The microneedling procedure should be performed in a series of 4-6 treatments repeated every 2-4 weeks. After completing the series, a 3-month pause is recommended.

The final effects of medical microneedling are not immediately visible, as the synthesis of new collagen takes about 3 to 6 months after the completion of the series of treatments [1, 3, 4].

Indications for micro-needle mesotherapy

The micro-needle mesotherapy treatment is intended for people between 30 and 70 years old. Its main purpose is to perform thousands of micro-punctures in the skin aimed at stimulating natural repair mechanisms, as well as increasing the penetration of active substances through the skin barrier. As a result, new deposits of collagen and elastin are created, as well as increased production of hyaluronic acid. Accordingly, micro-needle mesotherapy treatment is used both in anti-ageing prevention and in the broadly understood rejuvenation of facial skin by firming, moisturizing, improving the facial oval and shallowing wrinkles. Indications for the procedure also include hyperpigmentation, which is lightened by stimulating melanocytes to produce melanin properly. In addition, microneedling is successfully used to reduce acne lesions, dark circles under the eyes, narrowing of dilated sebaceous gland orifices, and the reduction of stretch marks and scars, both atrophic and post-surgical. Micro-needle mesotherapy is also used in hair loss inhibition therapy for various types of alopecia [1, 4, 8].

The microneedling procedure is recommended for people with thin, and delicate skin. It also brings excellent results for mature and very damaged skin [4].

Regular micro-needle mesotherapy in a series of treatments improves skin texture and function. The skin becomes tighter and more elastic, and the thickness of the living layers of the epidermis increases [4].

AIM OF THE STUDY

The study aimed to evaluate the effectiveness of micro-needle mesotherapy treatment in anti-ageing prevention and in reducing signs of skin ageing.

MATERIAL AND METHOD

To assess the satisfaction level of female clients undergoing micro-needle mesotherapy treatment, a survey method was employed. The study group consisted of 40 women between the ages of 35 and 55 who had received at least one micro-needle mesotherapy treatment for the facial area. The research tool used to implement the chosen research technique was an anonymous, proprietary survey questionnaire conducted online. The survey targeted clientele of cosmetology clinics in Poland who underwent micro-needle mesotherapy treatments. The poll questionnaire of 29 closed questions and one open-ended question, performed from March 11 to April 27, 2023. Participation in the questionnaire was voluntary.

RESULTS

The research tool used to implement the chosen research technique was an anonymous questionnaire. The first question asked about the age of the female respondents (fig. 1).

The largest percentage were women aged 35-40 (47.5%), followed by women aged 41-45 (20%), and third were women aged 51-55 (17.5%), while the smallest percentage of respondents were women aged 46-50 (15%).

Based on the results, it is suggested that the highest interest in micro-needle mesotherapy treatment is among women in the age range between 35 and 40. Significantly lower, by more than half, was the percentage of respondents over the age of 41. The data indicate that the number of women using this procedure decreases with age - above the age of 41, the number of respondents undergoing microneedling is already significantly lower. This may indicate that younger women are more open to new technologies used in cosmetology, or that the procedure is particularly effective in preventing skin aging at a younger age.

The second question concerned the education of the female respondents (fig. 2).

In the survey, the vast majority were women with a master's degree (52.5%), followed by those with a bachelor's degree (30%), and a smaller proportion with a high school education (15%). In contrast, vocational education was declared by a negligible percentage of women.

These results may suggest that micro-needle mesotherapy procedures are more often chosen by women with higher education. This may be because education is often associated

with a greater awareness of the benefits of cosmetological procedures and a better economic situation for these respondents.

The third question was about the place of residence (fig. 3).

The largest number of respondents were women living in large cities with more than 500,000 residents (42.5%). 20% were surveyed living in cities with up to 100 thousand residents and an identical percentage (20%) were women living in villages. Respondents residing in medium-sized cities with up to 500 thousand residents made up the lowest percentage (17.5%).

Based on the results presented, it can be concluded that the largest group of respondents using micro-needle mesotherapy treatment are residents of large urban areas. This fact may be due to the greater number of cosmetology offices in these areas, which translates into easier access to this type of service. Nevertheless, it is important to note that a significant proportion of the women surveyed live in smaller cities and rural areas, which may suggest that micro-needle mesotherapy treatments are also popular in these areas, despite the potentially lower availability of such services.

The next question was about labor activity (fig. 4).

The highest number of respondents (47.5%) were self-employed women, and a slightly lower percentage (45%) were salaried women. The lowest percentage surveyed were students (7.5%).

Based on the above results, it can be concluded that most of the respondents are economically active women. It can be concluded that active women are more likely to choose to take care of their appearance, which may be related to the income and their willingness to invest in their appearance.

The fifth question concerned the amount of monthly salary (fig. 5).

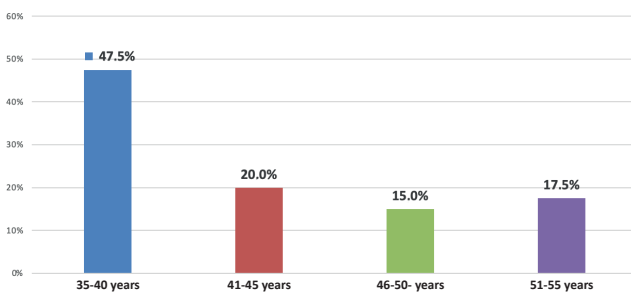


Fig. 1 Age of respondents Source: Own elaboration

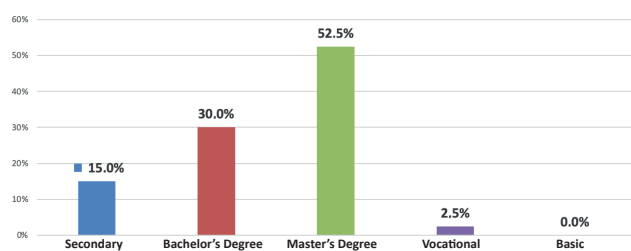


Fig. 2 Education of respondents Source: Own elaboration

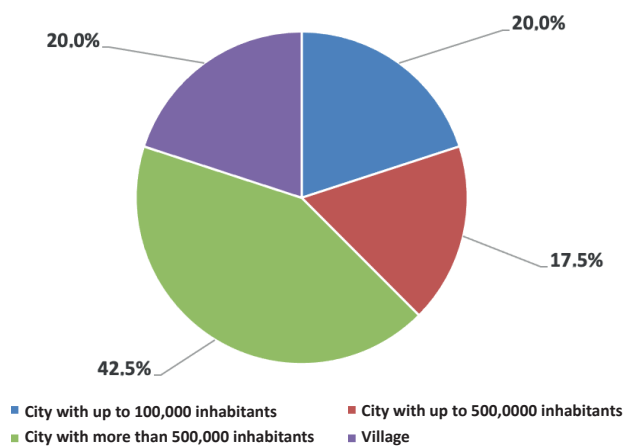


Fig. 3 Place of residence Source: own elaboration

The study results indicate that the predominant category consisted of women earning between PLN 2,700 and PLN 5,000 net, comprising 45% of participants. The second largest group were women with earnings between 5,100 and 10,000 PLN (30%). 20% of the respondents declared a monthly salary of more than PLN 10,000, while 5% indicated earnings of less than PLN 2,700.

Based on the results of the study, it can be concluded that micro-needle mesotherapy is a popular treatment among different income groups, and the salary is not the only determinant of the use of cosmetology services.

The sixth question concerned the frequency with which female respondents used treatments at beauty salons (fig. 6). Most of the women surveyed (37.5%) used the treatments offered by beauty salons once a month. Slightly fewer (32.5%) used treatments at beauty parlours several times a month. A smaller percentage of respondents (25%) visited beauty salons several times a year. A negligible number of female respondents (2.5%) attended a cosmetologist once a year, and an equally low percentage of women asked (2.5%) used cosmetology services less than once a year.

Based on the data presented, it can be concluded that the respondents regularly use the services of cosmetology offices. It is reasonable to assume that regularity in the use of cosmetological treatments may translate into noticeable effects of the treatments. The coherence of visits suggests that the women surveyed are satisfied with the services offered, prompting them to use them again.

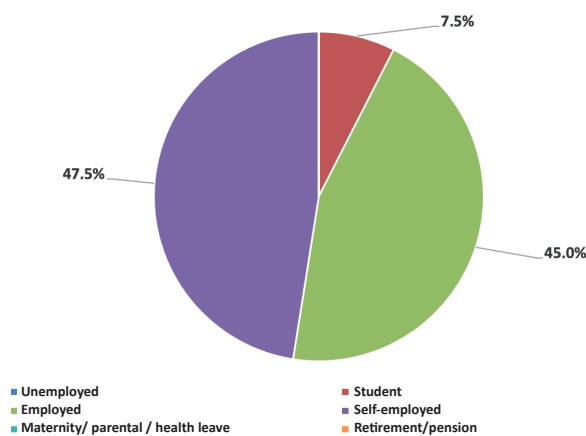


Fig. 4 Labor activity of respondents Source: Own study

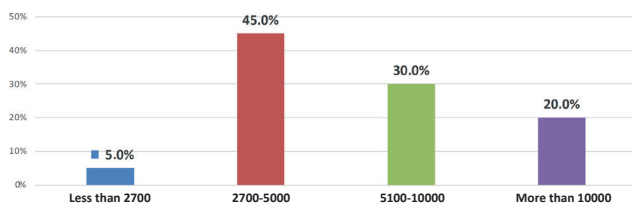


Fig. 5 Net monthly salary of respondents. Source: Own elaboration

The seventh question was whether the respondents had used a micro-needle mesotherapy treatment in the past (fig. 7).

The vast majority of women surveyed (95%) had used a micro-needle mesotherapy procedure in the past. Only 5% of the women participating in the survey had not used a microneedling treatment before.

Based on the above data, it can be assumed that the micro-needle mesotherapy treatment meets the expectations of clients of beauty salons, which is confirmed by their decision to use this procedure again.

The eighth question concerned the number of micropuncture treatments the respondents had undergone (fig. 8).

A large percentage of the women surveyed (70%) performed the micro-needle mesotherapy procedure 3-6 times. An almost three times lower percentage of respondents (25%) performed the procedure 2-3 times. A much smaller percentage of female respondents (5%) performed the procedure only once.

Based on the above results, it can be concluded that the vast majority of female respondents performed the recommended number of microneedling treatments. Such an outcome can positively influence the results obtained, and also contribute to a reliable assessment of the effectiveness of these treatments.

The ninth question concerned the intervals at which micro-needle mesotherapy treatments were performed (fig. 9).

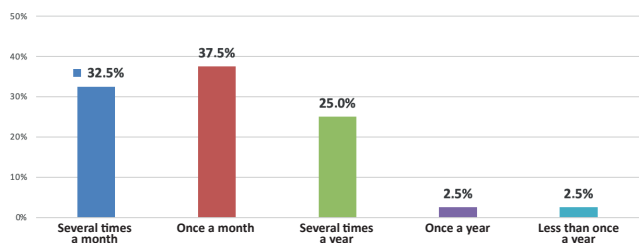


Fig. 6. Frequency of treatments application in beauty salons Source: Own elaboration

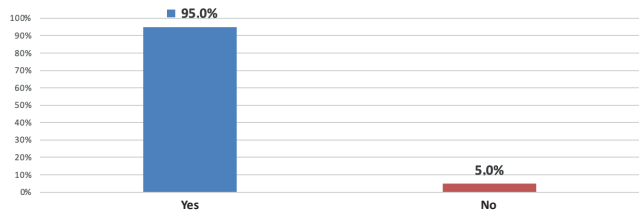


Fig. 7 Use of micro-needle mesotherapy treatment in the past by the respondents Source: Own elaboration

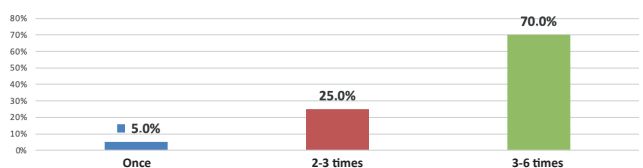


Fig. 8 Number of micro-needle mesotherapy treatments experienced by the respondents. Source: Own elaboration

Almost half of the women surveyed (47.5%) declared that the treatment was performed every 4 weeks, and almost half as many respondents (25%) performed treatments every 3 weeks. Applying treatments less frequently than every 4 weeks was declared by 25% of respondents, while a negligible percentage (2.5%) performed treatments more often than every 2 weeks.

Based on the above data, it can be concluded that the vast majority, almost 3/4 of the respondents, performed the treatments at the correct intervals, which may contribute to a more reliable assessment of the effectiveness of these treatments. According to the available literature, the recommended intervals between treatments are 3-4 weeks.

The tenth question enquired if the respondents observed an enhancement in skin tone following a series of treatments (fig. 10).

More than half of the women surveyed (62.5%) definitely noticed an improvement in skin tone, while 25% of them indicated that they tended to notice such an improvement. A small percentage (10%) of respondents said it was difficult to say whether they noticed a difference in the improvement of skin tension, while a negligible percentage of respondents (1%) said they did not notice any improvement.

Based on the above results, it can be concluded that micro-needle mesotherapy is an effective method of improving skin tone for the vast majority of women surveyed. Nevertheless, for a certain group of respondents, the results were less noticeable, which may be related to individual skin characteristics, the number of treatments performed, as well as compliance with post-treatment recommendations.

The eleventh question enquired if the surveyed women observed an improvement in skin firmness following a series of treatments (fig. 11).

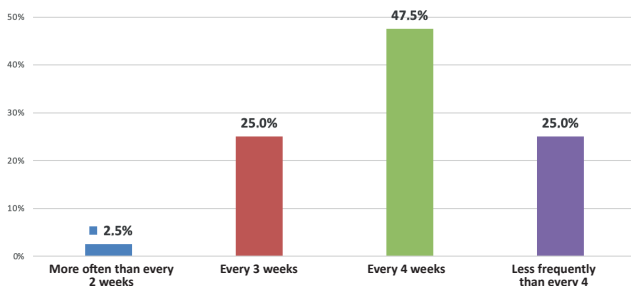


Fig. 9 Intervals at which micro-needle mesotherapy treatments were performed
Source: Own elaboration

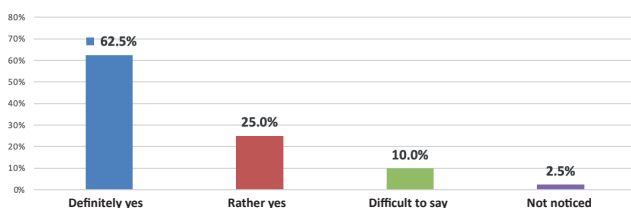


Fig. 10 An enhancement in skin tone following a series of treatments
Source: Own elaboration

The majority of women surveyed (60%) definitely noticed an improvement in skin firmness after the series of treatments, while 25% of respondents said they tended to notice such a development. Only 10% of survey participants said they were unable to say definitively whether they observed a difference in skin firming, while a small group (5%) did not notice any improvement.

Based on the results presented, it can be concluded that the overwhelming majority of female participants in the study noticed a significant improvement in skin firming. Satisfaction of the surveyed women with the effects of the treatment, allows us to assess the effectiveness of micro-needle mesotherapy as a therapy to improve the condition of the skin.

The twelfth question enquired if the surveyed women observed an enhancement in their facial oval lift following a series of procedures (fig. 12).

Less than half of the women surveyed (30%) definitely noticed an improvement in facial oval lift, while slightly fewer, 20% of respondents rather noticed an enhancement 35% of respondents were unable to say definitively whether they had observed an improvement in facial contour, while for 15% of the women surveyed the procedure made no noticeable difference.

In light of the data collected, it can be concluded that micro-needle mesotherapy has the potential to improve the facial oval, but the effects of the treatment may be experienced differently by those undergoing the procedure.

The thirteenth question enquired if the surveyed women observed an improvement in skin hydration following a series of treatments (fig. 13).

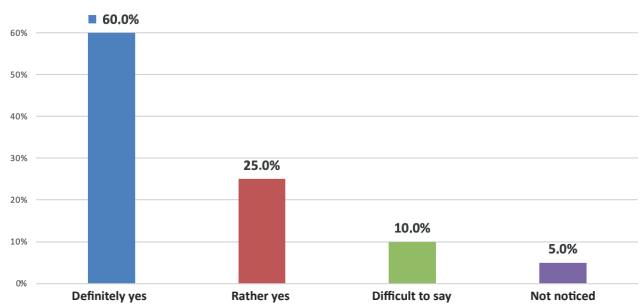


Fig. 11 An improvement in skin firmness following a series of treatments
Source: Own elaboration

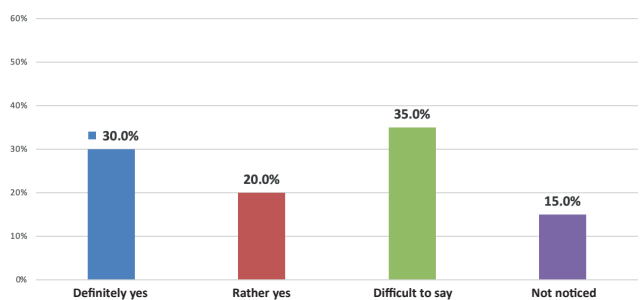


Fig. 12 An enhancement in their facial oval lift following a series of procedures
Source: Own elaboration

Nearly half of the women surveyed (45%) definitely noticed an enhancement in skin hydration after a series of micro-needle mesotherapy treatments. Another 35% of respondents rather noticed an improvement in this aspect. A small percentage of respondents (12.5%) found it difficult to assess any changes while only 7.5% of women did not notice any improvement in skin hydration.

Based on the data presented, it appears that micro-needle mesotherapy treatments clearly increased skin hydration for the vast majority of female respondents. Thus, it can be assumed that micro-needle mesotherapy is an effective method of improving skin hydration for most women.

The next question enquired if the surveyed women observed an improvement in wrinkle reduction following a series of treatments (fig. 14).

After a series of micro-needle mesotherapy treatments, 32.5% of the women surveyed said they definitely noticed a shallowing of wrinkles. A slightly higher percentage of respondents (40%) said they tended to see an improvement in wrinkle shallowness. Half as many women surveyed (20%) were unable to say definitively whether they saw any development, while 7.5% of the women surveyed saw no changes. The survey shows that micro-needle mesotherapy has noticeable results in wrinkle shallowing for the majority of female respondents. It is noteworthy, however, that some of the women surveyed could not clearly determine whether the treatment produced the expected results, and a small percentage of respondents did not notice any improvement. This suggests that the effectiveness of micro-needle mesotherapy for wrinkle smoothing may vary and depends on individual skin characteristics.

Question fifteen addressed respondents' satisfaction with the results of micro-needle mesotherapy (fig. 15).

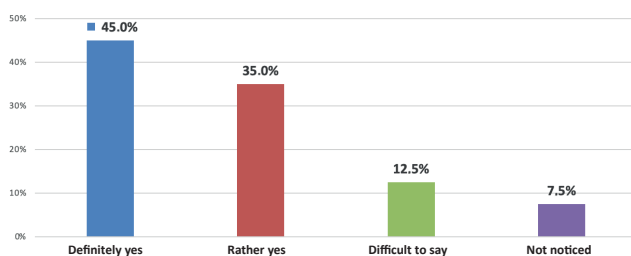


Fig. 13 An improvement in skin hydration following a series of treatments. Source: Own elaboration

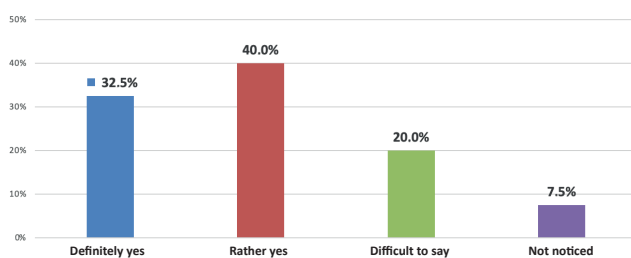


Fig. 14 An improvement in wrinkle reduction following a series of treatments. Source: Own elaboration

Most of the women surveyed (82.5%) expressed satisfaction with the results of the micro-needle mesotherapy procedure. Only 15% of respondents were unable to clearly assess their satisfaction with the procedure. Only a small proportion of respondents (2.5%) said they were not satisfied with the results obtained.

Based on the above data, it can be concluded that the micro-needle mesotherapy treatment is highly regarded among women, indicating the overall effectiveness of the procedure and its recognition as an effective method of improving the appearance of the skin.

Question sixteen enquired if the respondents received a treatment card to complete, detailing information on side effects and contraindications associated with micro-needle mesotherapy (fig. 16).

The vast majority of women surveyed (90%) were given a treatment card to fill out, which included information on potential side effects and contraindications to micro-needle mesotherapy. Only a small percentage of respondents (10%) were not asked to fill out such a card.

Based on the results of the survey, it can be concluded that the majority of beauty salons follow appropriate information procedures prior to performing micro-needle mesotherapy. Thus, most of the women surveyed were aware of all aspects related to the procedure.

Question seventeen enquired whether the respondents were informed about post-treatment recommendations after the micro-needle mesotherapy procedure (fig. 17).

More than half of the women surveyed (57.5%) received information about postoperative recommendations verbally. A slightly smaller group of respondents (42.5%) were informed of these recommendations in writing.

Based on these results, it can be concluded that all female participants in the study received the necessary information on post-procedure management. It can be assumed that

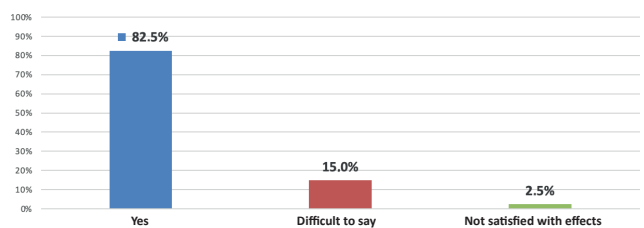


Fig. 15 Satisfaction with the effects of the micro-needle mesotherapy treatment. Source: Own elaboration

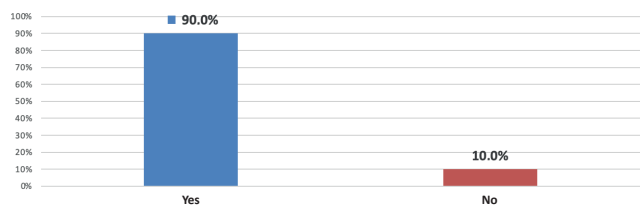


Fig. 16 Completion of a treatment card before the procedure, including information on side effects and contraindications of the micro-needle mesotherapy procedure. Source: Own elaboration

the reliable provision of information on post-operative recommendations by the person performing the procedure contributes to the effectiveness of the procedure and minimizes the risk of possible complications.

The eighteenth question enquired whether the respondents were informed about intensive moisturizing and oiling of the skin and the use of regenerative creams in their post-treatment recommendations (fig. 18).

The vast majority of female respondents (92.5%) were informed of the need for intensive skin moisturization and the use of regenerative creams in the post-surgery recommendations. Only a small proportion of respondents (5%) were not given this information, and 2.5% of the women surveyed could not recall whether such recommendations were given to them.

Based on the data received, it can be concluded that the vast majority of those who performed the procedure took care to communicate the recommendations for proper care of the treated skin. Thus, this contributes to the reduction of discomfort after the procedure and faster recovery.

Question nineteen enquired whether respondents had been advised to maintain proper hygiene, including changing pillowcases and face towels, in their post-surgery recommendations (fig. 19).

Nearly all of the women surveyed (97.5%) received information about the need for special hygiene after the procedure, including changing the pillowcase and face towels. Only a small proportion of respondents (2.5%) were not given such guidelines.

Based on the above data, it can be concluded that the vast majority of those who performed the procedure took care to communicate recommendations for maintaining proper

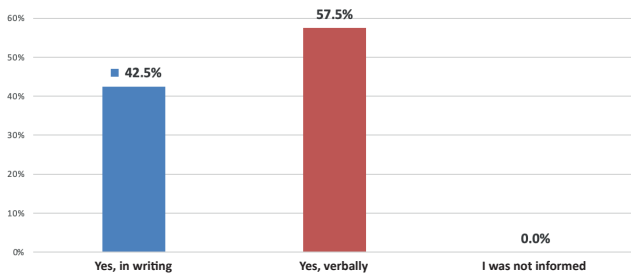


Fig. 17 Information about post-treatment recommendations after the micro-needle mesotherapy procedure Source: Own elaboration

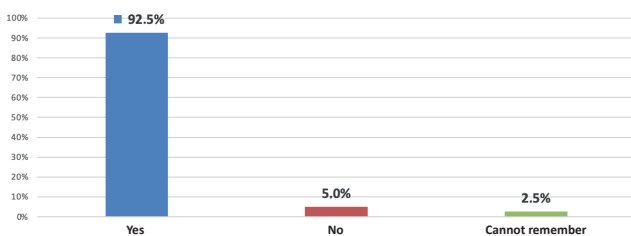


Fig. 18 Information in the post-treatment recommendations about the necessity of intense skin moisturization and the application of regenerative creams. Source: Own elaboration

hygiene after the micro-needle mesotherapy procedure. Thus, this contributes to reducing the risk of possible complications.

The twentieth question enquired if respondents had received instructions to refrain from extremely polluted places, as well as exercise and swimming pools, in their post-surgery guidelines for up to 72 hours following the treatment (fig. 20).

Almost all of the women surveyed (97.5%) received information in the post-treatment recommendations about the need to avoid heavily polluted areas, exercise and swimming pools until 72 hours after the micro-needle mesotherapy procedure. Only 2.5% of the women surveyed did not remember receiving such guidelines.

Based on the analysis of the survey results, it can be concluded that the standard of information transfer by those performing the treatments is at a high level, which is crucial for the safety and effectiveness of the treatment.

In question twenty-one, respondents were asked whether they had been advised to avoid saunas for seven days after the procedure in their post-treatment recommendations (fig. 21).

The vast majority of the women surveyed (97.5%) were informed in their post-operative recommendations to avoid saunas for a week after the procedure. Only a small percentage of respondents (2.5%) did not remember receiving such recommendations.

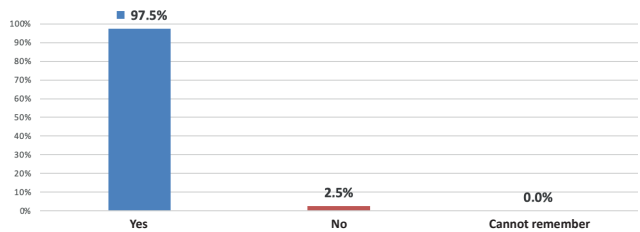


Fig. 19 Information in the post-treatment recommendations to maintain proper hygiene including changing the pillowcase and face towels Source: Own elaboration

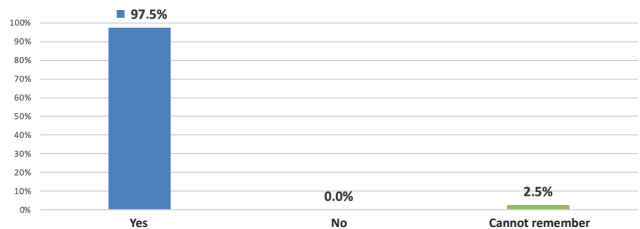


Fig. 20 Instructions in postoperative recommendations to avoid heavily polluted areas, exercise and swimming pool until 72 h after the procedure Source: Own elaboration

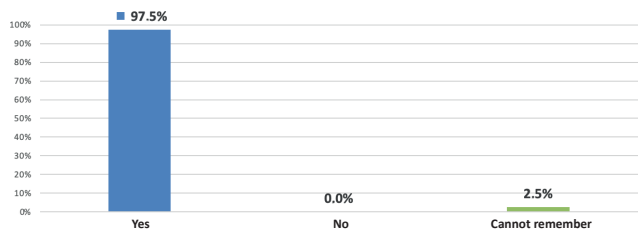


Fig. 21 Information in the post-treatment recommendations to avoid saunas for 7 days after the procedure Source: Own elaboration

The study's results indicate that the specialists' knowledge transmission quality is high, which is essential for therapy safety and efficacy. In question twenty-two, respondents were asked whether they had been advised to avoid sun exposure for a minimum of seven days after treatment in their post-treatment recommendations (fig. 22).

The vast majority of women surveyed (97.5%) were informed in their post-surgical recommendations to avoid sun exposure for a minimum of one week after the procedure. Only a small proportion of respondents (2.5%) were not informed of such recommendations.

These results indicate a high standard of information transfer by those performing the treatments, which contributes to improving the safety and effectiveness of the therapy.

Question twenty-three enquired whether, in the post-treatment recommendations, the respondents were informed of the need to use sunscreen (min. SPF 30) for about a month after the procedure (fig. 23).

The vast majority of women surveyed (95%) were informed of the need to use high sun protection (min. SPF 30) in post-surgical recommendations. Only a small percentage of respondents (2.5%) were not given such recommendations, and another 2.5% of women surveyed did not remember whether they had received such guidelines.

Based on the results presented, it can be concluded that the quality and reliability of the information provided by the specialists performing the treatments is at a high level, which is crucial for the safety and effectiveness of the treatment.

The twenty-fourth question enquired whether the respondents had been advised to avoid the use of non-steroidal anti-inflammatory drugs (NSAIDs), e.g. Ibuprofen, etc., for a period of about 14 days after surgery in their postoperative recommendations (fig. 24).

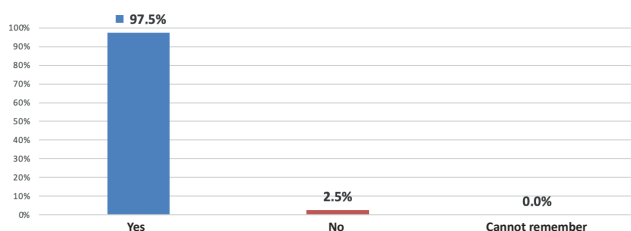


Fig. 22 Information about avoiding sun exposure for a minimum of 7 days after treatment in post-treatment recommendations. Source: Own elaboration

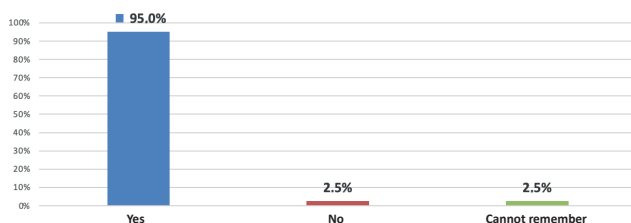


Fig. 23 Information about the necessity to use sunscreen (min. SPF 30) for about a month after the procedure in the post-treatment recommendations. Source: Own elaboration

About half of the women surveyed (47.5%) were advised to avoid the use of NSAIDs for about two weeks after the procedure. However, a fairly significant percentage of female respondents (30%) received no such recommendation. Moreover, 22.5% of the women surveyed did not remember whether they had received information on this subject.

Based on the analysis of the study results, it can be concluded that the knowledge of professionals performing the micro-needle mesotherapy procedure may be incomplete. It is particularly important to understand the mechanism of microneedling, which is directly related to the induction of controlled inflammation in the skin - a process necessary to initiate proper skin regeneration. The use of NSAIDs after the procedure can inhibit this process, resulting in an underestimation of the effectiveness of the therapy. Therefore, education of those performing microneedling procedures in this regard should be strengthened.

The twenty-fifth question inquired whether the respondents followed post-surgical recommendations (fig. 25).

The vast majority of women surveyed (85%) followed all post-surgical recommendations, while 15% of respondents followed only some of them.

Based on the above survey results, it can be concluded that the majority of women followed all post-surgical recommendations, which indicates their awareness of the importance of these guidelines for the effectiveness of treatment and avoidance of possible complications. In

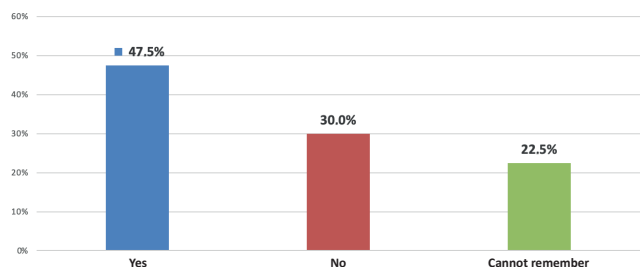


Fig. 24 Information in the postoperative recommendations to avoid the use of non-steroidal anti-inflammatory drugs (NSAIDs), e.g. Ibuprofen, etc., for a period of about 14 days after the procedure Source: Own elaboration

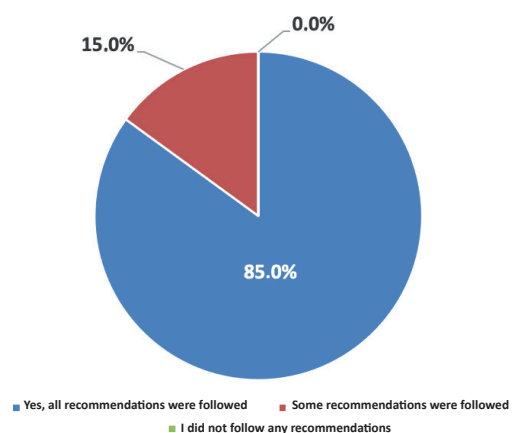


Fig. 25 Compliance with post-operative instructions. Source: Own elaboration

contrast, an undersized percentage of respondents followed only some of the recommendations, which may suggest the need for those performing the procedures to more effectively communicate and emphasize the importance of this information.

In the twenty-sixth question of the survey, the women surveyed were asked if they experienced any side effects after the procedure (fig. 26).

The vast majority of women surveyed (80%) experienced no side effects. In contrast, one-fifth of female respondents (20%) reported experiencing side effects after the procedure.

Based on the results of the study, it can be noted that most of the women surveyed did not experience any side effects after the micro-needle mesotherapy treatment. This suggests that the procedure is generally well tolerated.

In the twenty-seventh question, female respondents who confirmed experiencing side effects after the procedure (10 people) were asked to specify which discomforts they encountered (fig. 27).

The majority of women surveyed (70%) reported redness of the skin as a side effect after the procedure, while discomfort was reported by 40% of respondents. 30% of respondents reported that swelling was a side effect, while another 30% of women surveyed experienced tenderness and pain. Other side effects, not included in the survey, were experienced by 20% of the women surveyed.

Based on the above results, it can be concluded that the majority of female respondents did not experience side effects after the procedure. Among those who reported effects,

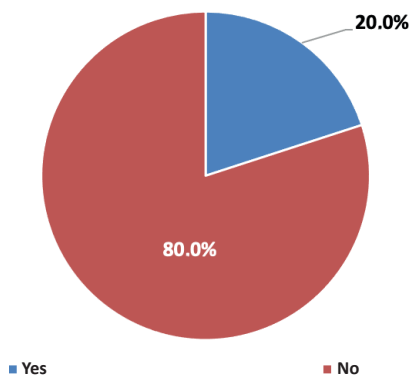


Fig. 26 Side effects experienced after the treatment Source: Own elaboration

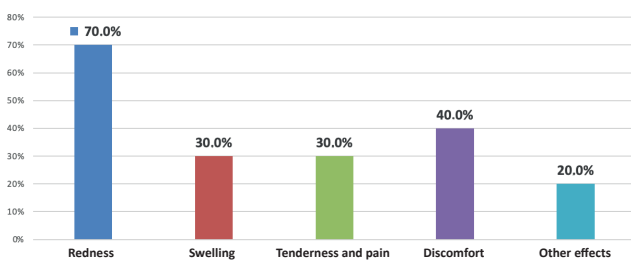


Fig. 27 Side effects which occurred after the treatment Source: Own elaboration

short-term symptoms predominated, which are not serious complications and usually resolve fairly quickly.

Question twenty-eight investigated whether female respondents smoked cigarettes (fig. 28).

A large group of respondents (82.1%) were non-smokers, while significantly fewer women surveyed said they smoked cigarettes (17.9%).

Based on the above survey results, it should be noted that most of the female respondents do not smoke, which may translate into better tissue regeneration and better results after the micro-needle mesotherapy procedure. It can be assumed that in the case of female respondents who are smokers, the repair processes may have advanced at a slower pace, and the results of the treatment may have been less noticeable.

Question twenty-nine asked respondents whether they intended to use the micro-needle mesotherapy treatment again (fig. 29).

The majority of women surveyed (90%) plan to undergo micro-needle mesotherapy treatment again. However, a small percentage of respondents (7.5%) are not sure whether they will perform such a procedure again. Only a small percentage of women surveyed (2.5%) say they do not intend to use this procedure in the future.

Analyzing the data presented, it can be concluded that the micro-needle mesotherapy procedure enjoys considerable recognition among the women surveyed, which may indicate its high effectiveness. A small percentage of respondents expressed uncertainty about undergoing this procedure again. This confusion may be due to a variety of factors, such as perceived side effects, satisfaction with the results, the cost of the procedure or individual preferences. A minimal percentage of women surveyed said they did not plan to undergo micro-needle mesotherapy in the future. The reasons for this decision may require further research to understand the motives behind this decision.



Fig. 28 Number of smokers in the group of respondents. Source: Own elaboration

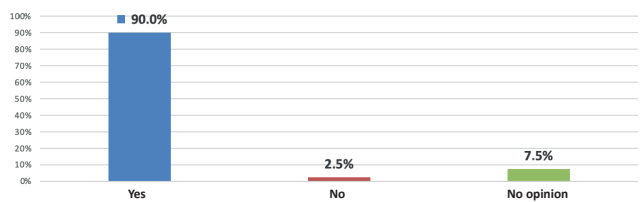


Fig. 29 Intention to use the micro-needle mesotherapy treatment again Source: Own elaboration

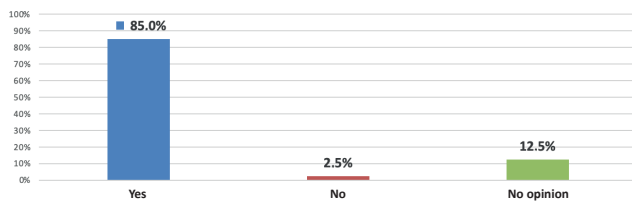


Fig. 30 Recommendation of micro-needle mesotherapy treatment as an effective method in anti-aging therapy **Source:** Own elaboration

Question thirty enquired whether female respondents would recommend micro-needle mesotherapy treatment as an effective method in anti-aging therapy (fig. 30).

The vast majority of female respondents (85%) would recommend micro-needle mesotherapy treatment as an effective anti-ageing therapy. At the same time, 12.5% of the women surveyed are not sure whether they would recommend this treatment. Only a small percentage of respondents (2.5%) would definitely not recommend micro-needle mesotherapy treatment as an effective method in anti-ageing therapy.

Based on the above results, it can be concluded that the micro-needle mesotherapy procedure is particularly popular among economically active women, living in large cities, aged between 35 and 40 years, with a university education. The results of the survey indicate a high level of knowledge among those providing cosmetology services in terms of reliably informing clients about contraindications and post-treatment recommendations. In addition, the vast majority of female respondents followed all post-treatment recommendations. Women participating in the survey noted numerous benefits after micro-needle mesotherapy treatment in the context of rejuvenation and slowing down skin ageing processes. The occurrence of dissatisfaction after the procedure among a negligible percentage of female respondents may be due to various reasons, such as unsatisfactory results, failure to follow all post-treatment recommendations, an unhygienic lifestyle or lack of full confidence in the effectiveness of this therapy.

DISCUSSION

Micro-needle mesotherapy is one of the most effective procedures used in cosmetology and aesthetic medicine offices, which has gained popularity in recent years. This procedure is used both in anti-ageing prevention and in the reduction of existing signs of aging. Micro-needle mesotherapy acts in two ways: first, it increases the absorption of active substances into the deeper layers of the epidermis and dermis through micro-punctures; second, it initiates a controlled inflammation that stimulates natural healing processes and the release of growth factors from the blood. These factors stimulate fibroblasts to produce collagen and elastin. Performing a series of micro-needle mesotherapy treatments translates into improvements in skin texture and function, including an increase in skin tone and elasticity and thickening of the epidermis [9, 10].

The research hypothesis of this study was if micro-needle mesotherapy treatments had a positive effect on improving skin tone, reducing wrinkles and enhancing the overall condition of the skin, resulting in effective anti-aging prevention.

The main aim of the study was to evaluate the effectiveness of micro-needle mesotherapy by female clients of beauty salons across Poland in the context of anti-aging prevention and reducing signs of aging. For the purpose of the study, a proprietary questionnaire was used, which was aimed at women who had undergone at least one rejuvenating procedure using micro-needle mesotherapy. The survey was designed to assess the effectiveness of the treatment, the degree of client satisfaction after the procedure, and to identify factors that may affect differences in results, such as the regularity of treatments and adherence to post-treatment recommendations.

The results indicate that micro-needle mesotherapy treatment is most popular among women between the ages of 35 and 40 (47.5%). A similar result was obtained in a study conducted by Ratajczak et al. on the effectiveness of micro-needle mesotherapy in skin rejuvenation [6]. The survey was conducted on a group of 45 people. In the cited study, the largest percentage of respondents were women aged 35-44 (33%). The data obtained may indicate that micro-needle mesotherapy treatment is more often chosen for anti-ageing prevention.

Most of the women surveyed had a master's or bachelor's degree (82.5%). A study by Ratajczak et al. found that those with a college or post-secondary education (76%) also had the highest percentage of those receiving micro-needle mesotherapy treatment [6]. The presented results may support the supposition that education is associated with greater awareness of skin ageing and the benefits of anti-ageing treatments.

The research above shows that the majority of female participants in the study who use micro-needle mesotherapy treatments are residents of large cities (42.5%), most of whom are self-employed (47.5%). These are women who regularly use cosmetic procedures (70%), and who have already used a micro-needle mesotherapy treatment in the past (95%). Based on the above analyses, it can be seen that these are people who live in larger urban areas and are economically active. This suggests that these respondents have greater accessibility to beauty salons and have incomes that allow them to use such services. In addition, the results show that the surveyed women regularly visit cosmetology salons, which may indicate their satisfaction and desire to return for more treatments.

The vast majority of respondents (70%) performed a cycle of 3-6 micro-needle mesotherapy treatments, at the recommended intervals of 3-4 weeks (72.5%). Performing the microneedling treatment in such cycles, and with the mentioned intervals between treatments, may contribute to

the effectiveness of the procedure and may have a positive impact on the reliability of the survey results.

In above study, it was proved that the vast majority of women, after undergoing a series of micro-needle mesotherapy treatments, noticed the following effects: improvement in skin tone (87.5%) and firmness (85%), boosted hydration (80%), wrinkle shallowing (72.5%) and facial oval lift (50%). The results obtained testify to the effectiveness of micro-needle mesotherapy, whose action is based on the mechanism of micro-punctures. Damage to the skin causes inflammation, which stimulates cells to multiply and initiates the process of creating new collagen and elastic fibres. These processes lead to skin remodeling, increasing skin thickness and tone and reducing the appearance of fine wrinkles [10].

Similar results were obtained in a study published by Glenc-Ambroży et al. [5]. The study investigated the effectiveness of dermarollers on improving skin condition on a selected group of 7 subjects aged between 20 and 50, who received a series of treatments. The participants showed an improvement in facial oval, skin elasticity and tone, a reduction in wrinkles and an increase in skin hydration. It is worth noting that depending on the individual case, the effects of the treatment were more or less visible. This indicates the important influence of individual predisposition to skin regeneration, its current condition, age, lifestyle and adherence to post-treatment recommendations [5].

A study on the use of micro-needle mesotherapy in biorevitalizing facial skin, conducted by Malgorzata Glenc-Ambroza and Laura Piejko, also found the treatment to be highly effective. The study was conducted on a group of five women aged 35 to 75. After a series of treatments, they found an improvement in skin firmness and tone, a shallowing of fine wrinkles, and an increase in skin hydration and thickening. As in the study discussed earlier, the effects were more or less noticeable depending on the case. The final result was influenced by several factors, including age, baseline skin condition, individual personal characteristics for tissue regeneration, lifestyle and adherence to post-treatment recommendations [9].

In a study conducted by Ratajczak et al., respondents most often cited the following effects: improvement in facial oval (64%), development in skin firmness (60%), reduction in fine wrinkles (58%), and boost in skin elasticity and tone (49%) [6].

The results confirm the effectiveness of micro-needle mesotherapy in rejuvenating the skin by stimulating its natural self-renewal and healing processes, resulting in increased skin tone and elasticity, and improved skin texture and appearance [11].

In the presented study, it was proved that the vast majority of women (90%) were informed about contraindications and side effects before the procedure. In addition, all of the interviewed women were provided with postoperative recommendations. This demonstrates that women were reliably informed about

contraindications and postoperative recommendations, which translates into increased effectiveness of the procedure, as well as minimizing the risk of potential complications.

A similar result was obtained in a survey of knowledge about micro-needle mesotherapy conducted by Kazimierczak et al. [7]. The study found that 79% of respondents were informed about contraindications, possible complications after the procedure, and post-treatment recommendations. The comparison revealed that in the cited study, the communication of information from the staff was less reliable than in the presented study.

Adherence to hygiene during the micro-needle mesotherapy procedure minimises the danger of infection low, and the procedure is considered highly safe. Despite this, side effects lasting 1 to 3 days may occur after the procedure. Among the most common side effects are redness, swelling, tenderness and pain, as well as a general feeling of discomfort [2].

Here, side effects were observed by 20% of the women surveyed, and included redness (70%), discomfort (40%), swelling (30%), and tenderness and pain (30%).

Similar results were presented by Ratajczak et al. [6]. In the cited study, the most common side effects were erythema, swelling (47%) and pain (27%). It is worth bearing in mind, however, that these effects are transient and disappear at the furthest several days after the procedure.

Based on the self-reported survey, it can be concluded that the majority of women (90%) plan to use the micro-needle mesotherapy treatment again, and 85% would recommend it as an effective method in anti-aging therapy. This demonstrates the high level of customer satisfaction with the quality and effects of the treatments, as well as the high popularity of this type of treatment.

Similar results were obtained in a study by Malgorzata Glenc-Ambroza and Laura Piejko. When asked whether they would recommend mesotherapy treatment as an effective method in anti-aging therapy, all the women surveyed answered in the affirmative.

The results obtained are also confirmed by Ratajczak et al. [6]. In the cited study, 96% of the respondents indicated a high degree of satisfaction with the results obtained after a series of micro-needle mesotherapy treatments.

Comparing the results of the presented study to the analyses of other researchers in the context of client satisfaction with the effects of micro-needle mesotherapy treatment allowed a more accurate assessment of the results obtained. The comparison showed many similarities with other studies, and minor differences also appeared, but the general trends were similar. Based on the comparative analysis, it can be concluded that micro-needle mesotherapy treatment is an effective method for both skin rejuvenation and anti-ageing prevention. Performing a series of treatments has the effect of increasing skin tone and elasticity, increasing skin hydration, improving the facial oval and shallowing wrinkles, among

other things. The results confirmed previous findings in the literature in this area, and the conclusions drawn from them proved accurate. In the future, it is worth considering expanding the study to include a deeper analysis of this topic and the use of new research methods.

CONCLUSIONS

Based on the data collected and analyzed, the following conclusions were made:

1. Corrective mechanisms resulting from controlled, mechanical damage triggered by micropuncture has a beneficial effect on regeneration, leading to improved skin texture, tone and elasticity, thickened epidermis and improved epidermal function, and boost overall external appearance, as confirmed by literature studies in this area.
2. Based on the author's questionnaire, it was shown that women who use micro-needle mesotherapy treatment are most often in the age range between 35 and 40 years old, usually come from large cities, are professionally active, have a university education and regularly use cosmetological treatments. This indicates high accessibility to cosmetology salons, awareness of the benefits of the treatments, satisfaction with the results, and owning the income to use such services.
3. The women surveyed expressed a high level of satisfaction with the results of the micro-needle mesotherapy treatment and a desire for repetition. The respondents would recommend the micro-needle mesotherapy treatment as an effective anti-ageing therapy. This shows that it is a treatment that is not only effective but also well-tolerated and safe.
4. The results of the study are consistent with previous findings in the literature, as well as in the comparative analysis conducted in this study, confirming the effectiveness of micro-needle mesotherapy as a method of both skin rejuvenation and anti-ageing prevention.
5. The research confirms the effectiveness of micro-needle mesotherapy in anti-ageing prevention, reducing signs of skin ageing. It was observed to have a positive effect on increasing skin tone and elasticity, raising the oval of the face, increasing skin hydration and shallowing wrinkles.
6. Despite the positive results, in the future it would be worthwhile to expand the study to include more advanced

research methods to analyse in detail the effects of micro-needle mesotherapy on different skin types, as well as to study the long-term effects of this treatment.

SUMMARY

Skin ageing is a natural, complex and inevitable process that begins after the age of 25. The picture of ageing skin is superimposed on two types of ageing: intrinsic, characterized by the predominance of atrophic processes, and extrinsic, in which hypertrophic processes are prevailing. With age, the skin becomes thinner and less hydrated, loses elasticity and firmness, and wrinkles appear, resulting in a general loss of vitality.

Micro-needle mesotherapy treatment is an effective method in anti-ageing prevention and in reducing signs of skin ageing. The results of the study indicate that micro-needle mesotherapy has a positive effect on increasing skin tone and elasticity, raising the facial oval, increasing skin hydration and shallowing wrinkles. These conclusions are consistent with the available scientific literature and the comparative analysis conducted in this study, and confirm the effectiveness of mesotherapy as a method of rejuvenation and anti-ageing prevention.

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