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ESTIMATION OF SELECTED SKIN PARAMETERS DURING A SERIES OF BEAUTY TREATMENTS IN WOMEN WITH ACNE: A PILOT STUDY

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A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Acne vulgaris occurs most often in young people and can significantly decrease the quality of life. Properly selected dermatological therapy and cosmetic procedures can effectively improve the skin condition of acne patients.

Aim of the study: The aim of this study was to examine how various cosmetics treatments affect facial sebum levels, skin hydration, and desquamation in young women with acne vulgaris.

Material and methods: 101 women with acne aged 19–29 (M=22.5 years, SD=2.3 years) were included in the study. The following cosmetic treatments were used over a 12-week period: intensive pulsing light, alpha-hydroxy acids, cavitation peeling, non-needle mesotherapy, diamond microdermabrasion, and sonophoresis. Skin parameters, including oily skin level, desquamation level, and moisture level were analyzed twice (at baseline and after 12 weeks) using a Nati skin analyzer.

Results: The series of cosmetic procedures significantly improved skin lubrication (p<0.0001), hydration in the T zone (p<0.0001), and desquamation (p<0.0001).

Conclusions: The use of modern cosmetic devices in the beauty studio can be very effective for the treatment of acne lesions.

KEYWORDS: acne vulgaris, microdermabrasion, AHA, cavitation peeling, sonophoresis

Background

Acne vulgaris is a dermatological disorder with a multifaceted pathogenesis. Although this disorder usually occurs between 11 and 30 years of age, it is increasingly affecting adults. [1] While acne can be problematic because of the number of skin eruptions, it is also associated with various psychological issues (e.g., anger, aggression, depression). Indeed, individuals with acne can have a very low level of self-esteem and can experience social isolation problems due to unsightly skin changes. Suicide attempts, due to long-term and unsuccessful treatment, have also been reported. [2-4]

There are several forms of acne vulgaris including comedones, blackheads, whiteheads, papules, pustules, nodules and cysts. The formation of acne can be caused by the excessive production and accumulation of sebum, and by blockage of the sebaceous glands. These conditions can promote bacterial growth (e.g., *Propionibacteriumacnes*) and the formation of micro comedones. [5-7] Other factors that may cause dermatosis include the development of inflammation, excessive keratinization of the epidermis at the mouth of the hair follicle, hormonal disorders, genetic factors, and inadequate diet. [8,9]

Studies have shown that sebaceous gland activity is regulated, in part, by cytokines, androgens, epidermal growth factor, cortisol, corticotropin releasing hormone, growth hormone, and neurohormones. In recent years, increased attention has been paid to the role of stress in the pathogenesis of acne. Skin changes can generate social and emotional problems, and additional stress can increase the occurrence of dermatoses in the form of skin eruptions. [10-13]

In cosmetology, many treatments are used to reduce skin eruptions or excess sebum on the surface of the epidermis, including cosmetic acids, sonophoresis, needle-free mesotherapy and microdermabrasion. These treatments have minimal side effects and do not affect the client's everyday life, while producing the expected results. Glycolic acid peel has been very popular for years, with the most common form being the alpha-hydroxy acid peel (i.e., the fruit peel). [14,15] Wiegmann et al. examined the efficacy of a serum composed of glycolic and salicylic acid for patients suffering from mild-to-moderate inflammatory and cystic acne, rosacea, folliculitis, and keratosis pilaris. Patients were asked to apply the wake-up serum at night for 2 weeks. Over 90% of the patients reported a significant overall improvement in acne with a decrease in comedonal and cystic acne. In addition, 70–80% of the patients reported decreased oiliness, even texture, and smoother looking skin. [16]

Aim of the study

The aim of this study was to determine if a series of cosmetic treatments help to improve acne vulgaris, as measured by several skin parameters.

Material and methods

The Bioethics Committee of Wroclaw Medical University approved this study. Every potential study participant was informed of the aim of the study. All study participants provided written informed consent and were informed that they could withdraw from the study at any time, without giving a reason.

Participants

Patients enrolled in the study were required to meet the following eligibility criteria: over 18 years of age, no dermatological treatment within last 12 months, and mild-to-moderate papulopustular acne as assessed by the Scale of Hellegren-Vincent Severity Symptoms. Exclusion criteria included active inflammation of the skin, bacterial, viral, allergic, and fungal relapsing skin diseases, disturbed skin continuity, fresh surgical procedures in the treatment area, active herpes, treatment with isotretinoin, reduced immunity, allergy to peeling ingredients, pregnancy, or lactation.

In total, the study group consisted of 101 women aged 19–29 years (M=22.5 years, SD=2.3 years. All subjects were diagnosed with acne vulgaris in the facial region. In these participants, acne was reported to have occurred over the course of 3–15 years (M=8.1 years, SD=2.7 years).

Treatment protocol

The following cosmetic treatments were used on all participants: sonophoresis, non-needle mesotherapy, intensive pulsing light (IPL), cavitation peeling, alpha-hydroxy acids, and diamond microdermabrasion. A total of six sessions were performed, each separated by two weeks. For home care, the use of micellar fluid and a mild moisturizer with a minimum SPF 30 was recommended. The patients were asked to completely exclude acne cosmetics and not to use any new treatments. The study was carried out from 2013 to 2014 in beauty parlors in Poland.

Data collection

Skin measurements were made using a Nati skin analyzer (Beauty of Science SP.ZO.O, Wroclaw, Poland). This device is used for comprehensive computerized cosmetology diagnostics. The skin analyzer uses a modern physical measurement system and a digital camera with HD Ready Technology. The use of a 2-in-1 measurement system allows for physical and optical analysis of the skin, and thus an objective assessment of the patient's skin condition.

Measurement of skin parameters was carried out in the morning, before the first cosmetic treatment and one day after finishing the treatment series. Measurements were taken at 20°C with 45% relative humidity. All patients were instructed not to wash their faces or to apply any cosmetics products for 12 hours before the treatment. The following parameters were assessed: oiling and moisturizing in the T zone (i.e., the area between brows), and desquamation (on the cheek, 5 cm from the nose wing; see Table 1 for more details).

Statistical analysis

All variables were normally distributed as verified by the Shapiro–Wilk test. To compare the results, the Student's t-test for repeated measures was applied. For all comparisons, a p-value of less than 0.05 was considered statistically significant. All data were analyzed using STATISTICA 13.1 software.

Results

The range and interpretation of the values obtained by the Nati skin analyzer are shown in Table 1. The range in the percent value for oiling at baseline was between 24.3% and 87.6% (M=59.3%, SD=18.3%), and after 12 weeks of the treatment was between 9.1% and 67.5% (M=32.6%, SD=12.9%, t[100]=14.07, p<0.0001).The range in the percent value for desquamation at baseline was between

5.2% and 18.0% (M=9.6%, SD=2.7%), and after 12 weeks of the treatment was between 3.5% and 16.0% (M=8.2%, SD=2.0%, t[100]=5.01, p<0.0001). The range in the percent value for moisturizing at baseline was between 10% and 63% (M=28.4%, SD=10.9%), and after 12 weeks of the treatment was between 16% and 60% (M=37.7%, SD=9.8%, t[100]=–8.06, p<0.0001).

Table 1. The interpretation of percent values for oiling, desquamation, and moisturizing.

Skin parameter	Range (%)		Interpretation
	Min.	Max.	
Oiling	1	10	Dry skin
	11	14	Skin tends to overdrying
	15	20	Proper skin lubrication
	21	25	Skin with a tendency to oily
	26	100	Oily skin
Desquamation	0	14	Normal
	15	20	Distorted
	21	100	Excessive
Moisturizing	0	24	Alarming
	25	40	Incorrect
	41	65	Normal

Discussion

Individuals suffering from acne vulgaris usually have a great problem with accepting their own appearance. Skin lesions located on the face in particular can cause great discomfort and feelings of shame. Unfortunately, there is still a belief that a woman's face should be flawless, without any skin eruptions. For these reasons, effective treatments for acne vulgaris are needed. The current study shows that a series of cosmetic treatments in individuals suffering from acne vulgaris significantly improved selected skin parameters, including oiling, desquamation, and moisture levels. The average skin lubrication decreased by 26.7%, indicating less sebum secretion, and the average moisturizing of the skin was improved by 9.3%, while the average desquamation was decreased by 1.4%.

Previous work has demonstrated the effectiveness of some of the individual treatments used in the current study. Our results are consistent with the findings of Kmieć, who reported a significant decrease in oiling and improved skin hydration among 25 individuals treated with glycolic acid peels. Sarkar et al. also compared the effects of 35% glycolic acid, 20% salicylic acid, and 10% mandelic acid in people with acne vulgaris following a series of six treatments. A significant reduction in inflammatory and non-inflammatory lesion count was noted at 12 weeks in all three study groups. [25]

Chilicka et al. were the first to compare the effectiveness of azaleic and pyruvic acids. It was reported that these acids produced similar a decrease in acne severity and lesions. However, significant differences between these two agents were shown in the extent of oily skin levels. Pyruvic acid tended to reduce oiliness to a greater extent (by about 19% at week 12) compared to azaleic acid (by about 13% at week 12). [23] Recent studies, also conducted by Chilicka et al., used a new cosmetic treatment – hydrogen purification, and showed very good results in terms of reducing skin eruptions and excess sebum on the surface of the epidermis. The level of sebum was decreased, and moisture levels were increased, following hydrogen purification. [24]

Other studies have shown an improvement in skin hydration by 11%, and a decrease in oil content by 18%, following the use of a combination of microdermabrasion and glycol peeling. [17,18] Kołodziejczak et al. also conducted a series of six combined microdermabrasion and cavitation peeling treatments over 10–14 days, and a significant improvement in skin sebum level was observed in all areas examined. [26]

Lu et al. showed that IPL is not as effective as other supplementary therapies for the treatment of acne. For inflammatory acne lesions, the efficacy of IPL was poorer than that of Photo Dynamic Therapy (PDT). [27] Monib et al. compared the efficacy of IPL and Nd:YAG laser treatment on face lesions in patients with inflammatory and non-inflammatory acne. The patients received three sessions of laser treatment separated by 2 weeks. The improvement in total lesions was significant in the Nd:YAG group but non-significant in the IPL group (p<0.001 and p=0.13, respectively). [20-22] Thus, we recommend the series of cosmetic treatments used in the current study for all women with acne vulgaris. No studies have evaluated the effectiveness of sonophoresis or non-needle mesotherapy for acne prone skin.

It is worth mentioning that cosmetic treatments are not only used for people currently suffering from acne vulgaris, but also for patients with acne scars. Today, there are many effective methods used by cosmetologists to treat these scars. Minh et al. showed that microneedling improved the appearance of acne scars in all patients studied, and that 83.3% of the patients were satisfied after completion of the therapy. [28] Kim et al. evaluated the effects of fractional radiofrequency mesotherapy on facial acne scars, reporting that 73.1% of patients showed improvement after four treatments. However, hyperpigmentation was observed in 5 patients following this treatment [28]. Saadawi et al. also reported that treatment with a glycolic acid peel, microneedling, or combination of both procedures

decreased acne scars, with the greatest improvement seen with a combination of treatments. [19]

Study limitations

Our research results are promising. However, it would be useful to verify the effectiveness of these treatments in a larger sample of patients. Further studies should also include both sexes and people without any skin problems. The placebo effect for these treatments should also be examined, and future research should include a non-treated comparison group.

Conclusions

The cosmetic treatments utilized in the current study improved selected skin parameters in patients with acne vulgaris. Conducting a series of cosmetic treatments (performed six times, every two weeks) decreased the amount of sebum on the epidermal surface, increased skin hydration, and decreased desquamation in young women with acne vulgaris. These findings indicate that the current cosmetic regimen can be recommended to patients who suffer from acne.

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