

# Clinical and instrumental study of the efficacy of a new sebum control cream

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## Summary

**Background** Some botanical compounds are considered useful to reduce sebum production. **Aim** To evaluate the efficacy of a sebum control cream containing polyphenol-rich extract from saw palmetto, sesame seeds, and argan oil in subjects with oily facial skin.

**Methods** The study was carried out during the winter months (January and February). A total of 20 healthy volunteers (9 male and 11 female, aged 17–50 years, 16 with oily skin and 4 with combined skin) were studied. The test product was applied twice daily to the face for a period of 4 weeks. A clinical assessment and instrumental measurements were done before and after the treatment period. Casual sebum level on the forehead and both cheeks was determined with a photometric device (Sebumeter®). The quantity of sebum on the midforehead was determined using sebum collector foils (Sebufix®), which were then evaluated with skin camera Visioscope® and software SELS (Surface Evaluation of the Living Skin). A subjective evaluation questionnaire regarding the cosmetic characteristics, tolerance, and efficacy of the product was filled out by the volunteers at the end of study.

**Results** The product was very well accepted by all the volunteers. A visible sebum-regulating efficacy was reported in 95% of them. After 4 weeks of treatment, the clinical assessment scores decreased by 33%. There was a significant reduction in the casual sebum level by 20% and area covered with oily spots by 42%. The number of active sebaceous glands remained unaltered.

**Conclusion** These results objectively and quantitatively show the efficacy of the sebum control cream tested to reduce the greasiness and improve the appearance of oily facial skin.

**Keywords:** essential fatty acids, oily skin, plants, saw palmetto, skin bioengineering

## Introduction

Excessively oily facial skin is due to overactive sebaceous glands and can occur in both males and females. The skin is greasy and shiny, with large pores, feels unpleasant, and may be a serious cosmetic problem. Moreover, this

type of skin is much more prone to acne and seborrheic dermatitis. That is why the control over the excessive oiliness is very important.

Sebum production is stimulated by androgens.  $5\alpha$ -Reductase is the enzyme metabolizing testosterone in the skin into its more potent form dihydrotestosterone. There are two isoforms of  $5\alpha$ -reductase. The type 1 isoenzyme is located mainly in sebaceous glands, whereas the type 2 isoenzyme is located mainly in the prostate and hair follicle.<sup>1–3</sup> The application of pure inhibitor of  $5\alpha$ -reductase type 2 (finasteride) is useful for treatment of benign prostatic

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Accepted for publication September 2, 2006

hyperplasia, male baldness, and hirsutism but does not affect the sebum level.<sup>4,5</sup> It is supposed that the application of pure inhibitor of 5 $\alpha$ -reductase type 1 or dual inhibitor could be effective against to oily skin.<sup>1–3</sup> However, the recent study of Leyden *et al.*<sup>6</sup> has shown that the inhibition of type 1 5 $\alpha$ -reductase is not associated with clinical improvement of acne when used alone and does not enhance the clinical benefit of systemic minocycline. According to them, further studies are needed to better understand the action of androgens on sebaceous gland function.

There are some botanical compounds considered to inhibit 5 $\alpha$ -reductase, including saw palmetto extract, essential fatty acids ( $\gamma$ -linolenic acid,  $\alpha$ -linolenic acid, linoleic, and oleic acids), and phytosterols ( $\beta$ -sitosterol).<sup>7–9</sup>

Recently, a new natural compound, actively designed to control and reduce sebum production, was introduced. It is a clear, yellow to orange, slightly viscous solution containing polyphenol-rich fractions from the fruits of the North American saw palmetto and South American sesame seeds in a Moroccan argan oil base.

Previous *in vitro* study on the metabolism of testosterone in reconstructed human epidermis SkinEthic has shown that topically applied polyphenol-rich extract from saw palmetto, sesame seeds, and argan tree oil reduced the production of dihydrotestosterone from testosterone up to 35% vs. control. This result suggests that it possesses an inhibitory activity on skin 5 $\alpha$ -reductase and can be helpful for treatment of skin conditions accompanied by oily skin (Substantiation File of REGU-SEB, Pentapharm Ltd., Basel, Switzerland).

## Objective

The aim of this open-labeled study without placebo control was to evaluate the efficacy of a new sebum control cream containing polyphenol-rich extract from saw palmetto, sesame seeds, and argan tree oil in subjects with oily facial skin using clinical assessment and skin bioengineering measurements.

## Subjects and methods

### Subjects

Twenty healthy volunteers (9 male and 11 female; mean age, 36  $\pm$  11 years; range, 17–50), 16 with oily skin and 4 with combined skin, were enrolled in this study after given written informed consent.

The subjects were selected after a preliminary clinical examination, completion of a special questionnaire for determination of skin type, and quantitative measure-

ments of skin lipids on the face using sebumetry. The inclusion criteria were oily or combined type of skin and casual sebum levels over 220  $\mu$ g sebum/cm<sup>2</sup> on the forehead and over 180  $\mu$ g sebum/cm<sup>2</sup> on the cheeks. Participants were asked not to use any cosmetics and not to wash within 3 h of measurements.

### Test product

Test product was Day Cream AROMA PURE (AROMA, Sofia, Bulgaria), which is a part of the AROMA PURE cosmetic line for oily skin. This oil-free cream-gel contains 2% compound of *Sesamum indicum* (Sesam) seed extract, *Argania spinosa* kernel oil, and *Serenoa serrulata* (saw palmetto) fruit extract (REGU®-SEB, Pentapharm), 0.1% vitamin B6, physical ultraviolet filter (titanium dioxide), and special matting complex.

### Clinical assessment

The degree of skin oiliness on the face was assessed using a 5-point scale: 0, normal skin; 1, slightly; 2, easily visible; 3, obviously; and 4, extensive oiliness.

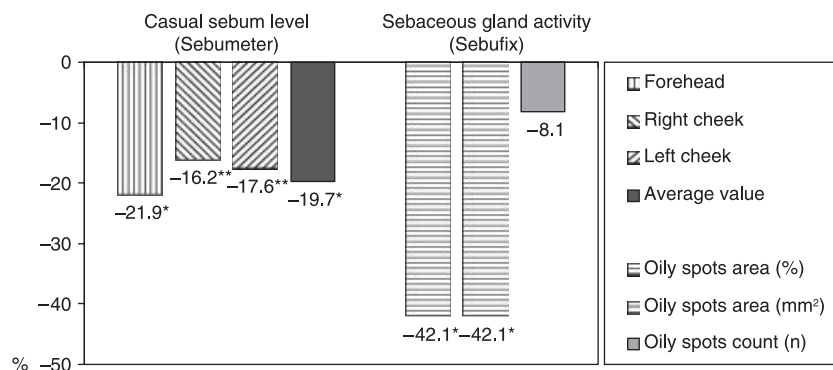
### Instrumental assessment

Casual sebum level on the forehead and both cheeks was determined with a photometric device (Sebumeter® SM 815, Courage+Khazaka, Cologne, Germany). A special opaque plastic tape (64 mm<sup>2</sup>) was pressed onto the skin for 30 s with a slight pressure to collect the sebum. The resulting increase in transparency of the tape was measured and the displayed values correspond to the sebum amount on the skin surface in  $\mu$ g sebum/cm<sup>2</sup>.

The quantity of sebum on the midforehead was evaluated using sebum collector foils (Sebufix® F16, Courage+Khazaka). The foils were applied to the skin surface for 30 s, and the absorbed sebum became visible as transparent spots in various sizes. The number and the size of the spots indicated the sebum excretion from the infundibular reservoir. Then the foils were evaluated with skin camera Visioscope® (Courage+Khazaka) and software SELS. The following parameters were analyzed: the percentage area covered by oily spots, the sebum area in square micrometer, and the number of oily spots.

### Self-assessment

A subjective evaluation questionnaire regarding the physical characteristics, tolerance, and efficacy of the product was filled out by the subjects at the end of the study.



**Figure 1** Changes in skin lipids after treatment ( $n = 20$ ). \*  $P < 0.0001$ ; \*\*  $P < 0.01$ .

### Study protocol

The present study has been carried out during the winter months (January and February).

Clinical assessment and all instrumental measurements were done by the author.

Two weeks before study begin and during the treatment period, the subjects were allowed only the use of regular cleansing products.

Approximately 500 mg of the tested product was applied to the face twice daily (mornings, 7:00–9:00; evenings, 19:00–21:00) over a 4-week treatment period by the subjects at home. The area around the eyes was omitted.

Clinical assessment and determination of skin sebum level were made before and after the treatment period. Measurements were done about 18 h after the last application and 3 h minimum after the last washing of the skin at controlled room temperature (21–25 °C) and relative humidity (28–38%). Before the skin measurements were made, the subjects remained in a sitting position for 15 min to acclimatize to ambient conditions.

### Statistical analysis

The changes in clinical scores were evaluated using Wilcoxon matched pairs test. The changes in sebaceous gland activity were evaluated using Student's *t*-test for paired data.  $P < 0.05$  was considered statistically significant.

## Results

### Clinical assessment

All subjects completed the study. A significant decrease in the severity of oily skin condition was shown by physician's visual assessment after 4 weeks of treatment with test product (33% reduction in mean scores;  $P < 0.001$ ).

### Instrumental assessment

The casual sebum level on the forehead and cheeks was significantly reduced by 20% towards the initial values ( $P < 0.001$ ). The percentage area covered by oily spots and the sebum area in square micrometer significantly decreased by 42% towards the initial values ( $P < 0.001$ ). The number of oily spots (active sebaceous gland) remained unaltered (Figs 1 and 2).

### Subjective assessment

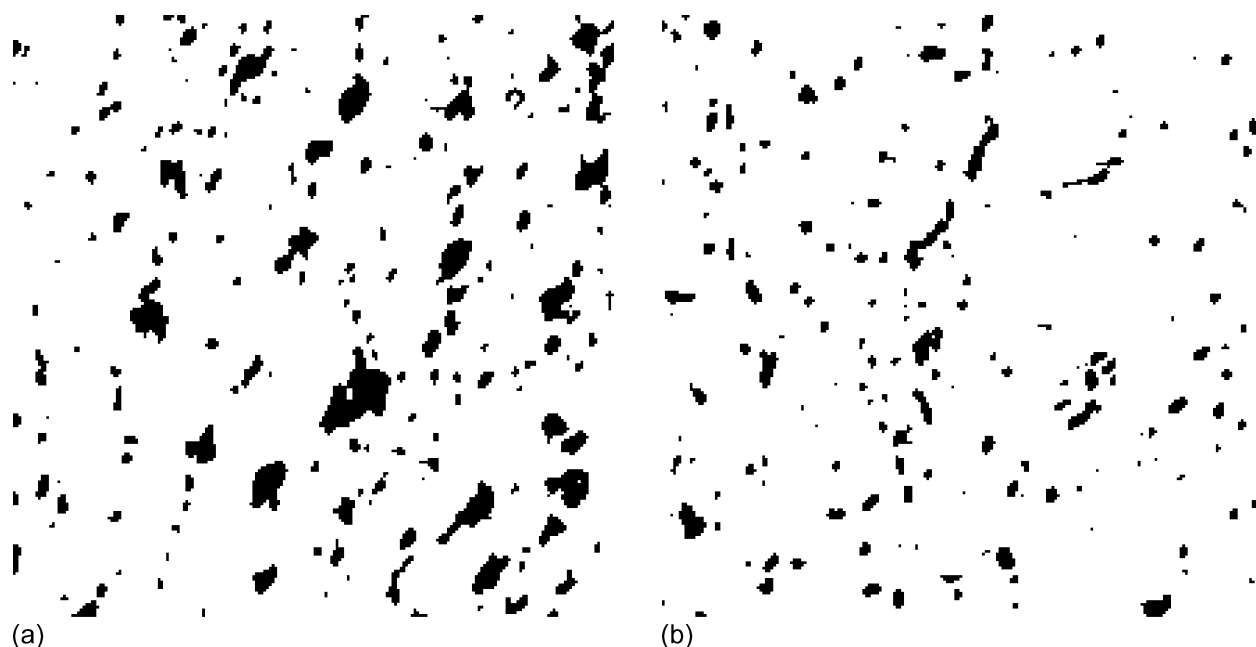
The product tolerability and cosmetic properties (consistency, spreadability, and permeation) were evaluated by 95% of the volunteers as "good" to "very good." A visible sebum-regulating efficacy was reported in 95% of them. The appreciation of the product efficacy by the participants is presented in Fig. 3.

There were no adverse events related to the test product during the study.

## Discussion

The polyphenol-rich extract from saw palmetto, sesame seeds, and argan oil is designated to regulate the excessive sebum production and improve the appearance of oily facial skin. Its effectiveness mainly comes from the content of natural fatty acids. Oleic, linoleic,  $\gamma$ -linolenic, and  $\alpha$ -linolenic acids found in plant oils have been individually proven to inhibit both types 1 and 2 of 5 $\alpha$ -reductase.  $\gamma$ -Linolenic acid, when applied topically, is also effective, with the absence of systemic effect.<sup>9</sup>

Saw palmetto, known as *S. serrulatum* or *Serenoa repens*, is a small palm native to the southeastern United States. Extract made from the fruits of saw palmetto is enriched up to 90% with fatty acids (oleic, lauric, linoleic, and myristic acids) and phytosterols ( $\beta$ -sitosterol and stigmasterol). Studies have shown that the lipido-sterolic extract of *S. repens* is an effective dual inhibitor of 5 $\alpha$ -reductase.



**Figure 2** Examples of sebum measurements using Sebifix®, Visioscope®, and SELS. (a) Before: oily spots area, 9.9% and 4,619 mm<sup>2</sup>; oily spots count, 189. (b) After: oily spots area, 5.4% (-45.5%) and 2,509 mm<sup>2</sup> (-45.5%); oily spots count, 172 (-8.9%).



**Figure 3** The appreciation of the product efficacy by the participants.

It prevents the conversion of testosterone to dihydrotestosterone by blocking the activity of the enzyme 5 $\alpha$ -reductase and also prevents binding of dihydrotestosterone to androgen receptors. There is a commercially available preparation (Permixon, BioMedic), which is used for systemic treatment of men with symptomatic benign prostatic hyperplasia and male-pattern baldness.<sup>10-13</sup>

*S. indicum* is a plant native to the East Indies. Now, it is found growing in most tropical, subtropical, and southern temperate areas of the world. The oil made from sesame seeds is mostly composed of the unsaturated oleic acid (40%) and linoleic acid (45%); natural antioxidants, such as lignans (sesamol, sesamine, and sesamol); and tocopherols (vitamin E). It is used as an ingredient in cos-

metics because of its anti-free radical, regenerative, and emollient properties. The balancing compounds found in this infusion regulate oil production, which in turn helps fight acne and to alleviate either really oily or really dry skin (<http://www.mdidea.com/products/new/new067.html> assessed at July 10, 2006).

*A. spinosa* tree is exclusively native to the geographic area of southwest Morocco. Argan kernel oil has a composition similar to that of sesame oil. It contains up to 80% unsaturated fatty acids, mainly oleic acid (45%) and linoleic acid (35%), as well as saturated fatty acids (palmitic and stearic acids), phytosterols, and tocopherols (vitamin E). It shows excellent antioxidative, skin protective, softening, and antidrying properties and is

recommended to reduce dry skin problems and slow down the appearance of wrinkles. The phytosterols in argan kernels are unique in their combination and were already used as a remedy for acne vulgaris in Moroccan folk medicine.<sup>14</sup>

Hughes-Formella *et al.*<sup>15</sup> have reported a significant decrease of 46% in clinical assessment scores in 12 volunteers with seborrheic dermatitis after 90 days of twice-daily application of a cream-gel containing 5% polyphenol-rich extract from saw palmetto, sesame seeds, and argan oil (Substantiation File of REGU-SEB, Pentapharm). Our results are in agreement with this observation and confirmed the clinical efficacy of this active ingredient on the severity of skin greasiness as assessed by physician's visual examination and subject's self-evaluation.

Moreover, for the first time, the present study establishes the efficacy of a cream containing polyphenol-rich extract from saw palmetto, sesame seeds, and argan oil using objective skin bioengineering techniques. We found a significant reduction of sebum level on the skin (20% decrease) and area covered by oily spots (42% decrease) after 4 weeks of twice-daily applications, although the number of oily spots (active sebaceous glands) was not altered significantly. The unaltered number of oily spots is a relevant finding because the opposite would suggest that some sebaceous glands are fully suppressed or destroyed. On the other hand, the decrease in the size of visible oily spots and area covered by oily spots, respectively, indicates a decrease in the amount of sebum in the follicular reservoir and would suggest some reduction in sebum production.

The difference between the values obtained with the two measuring techniques is probably due to the different measuring principles used. Lipid-absorbent tape of the Sebumeter® collects all the sebum present on the stratum corneum, including the follicular reservoir and the inter-follicular skin surface, whereas Sebifix® only absorbs the sebum present in the upper part of the infundibulum.<sup>16</sup>

Studies about the effect of topical 5 $\alpha$ -inhibitors on sebum production are very limited. Piccardi *et al.*<sup>17</sup> have investigated the activity of 5 $\alpha$ -Avocuta (butyl avocadate obtained from refined avocado oil) *in vitro* and *in vivo*. They found that 5 $\alpha$ -Avocuta is a potent inhibitor of type 1 5 $\alpha$ -reductase activity *in vitro*. Topical application of products containing 5 $\alpha$ -Avocuta (1% shampoo and 2% cream) improved greasy hairy and facial skin aspect evaluated clinically and significantly reduced sebum level measured with Sebifix® tests.

In conclusion, although not strictly designed, the present study shows with objective and quantitative methods the efficacy of the sebum control cream contain-

ing polyphenol-rich extract from saw palmetto, sesame seeds, and argan oil to reduce the greasiness and improve the appearance of oily facial skin. The results obtained were encouraging, and the studies on the topical application of natural 5 $\alpha$ -reductase inhibitors for management of sebum production should be extended.

## Acknowledgments

The author would like to thank Courage+Khazaka for supplying the skin camera Visioscope®, tests Sebifix®, and software SELS and AROMA for supplying the preparation.

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