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# Improvement of the quality of life of the patients with atopic dermatitis using the natural cosmetics regimen

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**Abstract**---Dermatitis can provoke depressive symptoms, causing an increased level of anxiety, especially in adolescents, and overall disrupt psychological comfort and balance. Psychogenic factors can exacerbate the disease and consequently reduce the quality of life. Therefore, it is essential to evaluate the impact of the quality of life and symptoms of atopic dermatitis. The study aims to check the effect of the combined skincare regimen of two formulations that have been developed using delicate preservation and lipid regeneration layer system to reduce homeostasis disorders in the form of irritation and/or inflammation on the patients' quality of life with the symptoms of atopic dermatitis. The study results approve the positive effect of the natural regimen for skincare for the patients with atopic dermatitis in connection with the decrease of the burden implied by the disease in both aspects of the visual and sensory effects that negatively impact the quality of life of the patients. This approves the idea that natural skincare regimen reduces the symptoms of atopic dermatitis, positively impacting the psychosocial condition of the patients.

**Keywords**---atopic dermatitis, natural skincare, skincare regimen.

## Introduction

Atopic dermatitis is a multifactorial inflammatory skin disease, one of the elements of the pathogenesis is the dysfunction of the epidermal barrier. [1]

Worldwide, the prevalence of AD among children is 20%, among adults - 2-8% [2] AD can often be accompanied by symptoms such as rash, redness, increased dryness, peeling, and itching for months and sometimes years. [3] These factors affect daily activities such as work, study, leisure activities, bathing, and putting on clothes, thereby significantly impairing patients' quality of life. [4] Atopic dermatitis symptoms can impact various aspects of the patients' life [5], especially given the fact that such symptoms as rashes and redness mainly tend to appear in the zone of the face, elbows, knees, and neck, that are usually visually open zones and visible to the society and surrounding people. [5] Therefore, people with atopic dermatitis symptoms may worry about their appearance and may experience difficulties in their private life, resulting in psychosocial and psychoemotional problems. [6] Moreover, the redness, dryness, and rashes impact the quality of the sleeping of the patients with dermatitis symptoms [7], which consequently may negatively impact the daily quality of life of the patient, as well as provoke fatigue and negatively affect the job performance. [8]

Dermatitis can provoke depressive symptoms, causing an increased level of anxiety, especially in adolescents, and overall disrupt psychological comfort and balance. [9] In addition, it is noted that the more the symptoms of atopic dermatitis appear, the more they affect the emotional stability of the patient, which consequently negatively affects the course of the disease. [10] Psychogenic factors can exacerbate the illness and therefore reduce the quality of life. Therefore, it is essential to evaluate the impact of the quality of life and symptoms of atopic dermatitis. Evaluating the patients' quality of life is an essential index in dermatology. At the same time, skin diseases might severely impact the patient's communication, relationships, social activities, and psychological and emotional condition. [11] Except for the physical assessment, the effect of the treatment or skincare can be analyzed via evaluating the quality of life. [12].

The study aims to check the impact of the combined skincare regimen of two formulations developed using delicate preservation and lipid regeneration layer system to reduce homeostasis disorders in the form of irritation and/or inflammation on the patients' quality of life with the symptoms of atopic dermatitis. The results of the study serve as the basis for future research and the development of the quality of life-improving regimen consisting of products of natural origin without using the traditional preservation system, therefore, reducing the potential irritating factor that tends to negatively contribute while decreasing the quality of life of the patients. There has been no natural cosmetics impact on the quality of life research conducted in Latvia on incidence; therefore, the study contributes to the issue of possible improvement of the quality of life of the patients with skin disorders based on nature-originated skincare product use.

## **Methods**

Numerous tools for assessing patients' quality of life with various skin conditions are broadly introduced in professional and scientific literature like the Dermatology Quality of Life Scales, Skindex, and others. [13] At the same time, it is reported to present specific difficulties when measuring the patients' quality of life with atopic dermatitis. [14] The most broadly used methodology for the assessment of the quality of life of the patients with atopic dermatitis is a

questionnaire based on the Psoriasis Disability Index [13, 15], Patient Generated Index [16], and Dermatology Life Quality Index [16, 17, 18]. In addition, the cross-cultural adaptation of the according questionnaire is essential, while, for example, the Quality Of Life index might not be suitable for the application in specific countries. [13] Simultaneously, Dermatology Life Quality Index (DLQI) has been proven used across the continents in different countries. [13, 19, 20] The broad application of the various techniques in assessing the quality of life of patients with skin diseases is defined by the results of the research that patients with skin issues tend to have depression and anxiety than the general population.

The single-center double-blinded randomized trial study was conducted in Latvia from November 2021 to January 2022. The research concluded of three steps, accordingly, the dermatological assessment of the symptoms of atopic dermatitis and the assessment of the life quality of the participant, use of the skincare regimen of natural origin, second the dermatological assessment of the symptoms of the atopic dermatitis and the evaluation of the life quality of the participant. The research is of qualitative nature, used the questionnaire of Dermatology Life Quality Index that consists of 10 questions concerning symptoms, feelings, daily activities, leisure, work, and personal relationships. Each question was answered by the participant using a tick box: “not at all”, “a little”, “a lot” or “very much”. Each question is scored from 0 to 3, and the scores are summed, ranging from 0 (no impairment of life quality) to 30 (maximum impairment). All questions relate to the “last week”. The DLQI was designed to be used in adults over the age of 18 years that complies with the patient inclusion criteria, therefore in the research, the DLQI Latvia/Latvian version of 04 February 2011 by Mapi Research Institute was applied in accordance with the need of the language and cultural adaptation of the questionnaire.

The research participants were selected on a voluntary basis after signing informed consent forms accepting participants of both genders. Fifty-two subjects showing the clinical signs of dry skin, mild-to-moderate dermatitis symptoms and/or diagnosed atopic dermatitis in the facial and neck zones are enrolled. At the same time, 43 have completed the study being considered as participants that formed the study sample. The age of the participants was from 19 to 51 (mean age = 35.51 years old). All participants having completed are females. The study did not involve an ethics committee while studies on cosmetic products are usually carried out without approval from an ethics committee. In Europe, all cosmetic products are safe for human use, according to the Cosmetic Regulation EC 1223/2009. The techniques employed in cosmetic testing and this study are non-invasive to minimally invasive. The study is carried out according to the declaration of Helsinki to take into account the research ethics related to investigations involving humans.

The inclusion criteria for the participants is as follows: over the age of 18 years, diagnosed atopic dermatitis and/or mild-to-moderate dermatitis symptoms in the facial and neck zones, not been recently involved in any other similar study, willingness to use during all the study period only the product to be tested in the facial and neck zones as well as the willingness not to vary the normal daily routine. After recruitment and assignment of subject numbers in sequential order of study visits, the research team member would dispense the package of skincare

regimen products to be used by a participant during the study labeled with the corresponding subject number. The codes were not revealed to the evaluators until the study was complete.

The skincare regimen consisted of two products: Product 1: The composition of gentle facial oil to milk cleanser has been created with oil phase greater than 90% to gently clean the face and remove all impurities (make-up, pollution particles) without negatively affecting skin natural pH system and defensive skin barrier. The product is formulated only with naturally derived ingredients. All the product components are carefully assessed and hypoallergenic potential is evaluated. The oil phase of the product consists of caprylic/capric triglyceride, coco caprylate/caprate, *Plukenetia Volubilis* seed oil, *Olea Europaea* fruit oil, *Vaccinium Macrocarpon* seed oil and *Helianthus Annuus* seed oil. When in contact with water, the oil gel acts as an O/W emulsion, and the structure turns into milk, which allows impurities to be easily rinsed off. The product is free from irritating preservatives, perfumes (and fragrance allergens). Product 2: The O/W cream base prepared for dermatitis-affected skin consists of ingredients from natural origin. The allergenic potential of the substances included in the composition of the cosmetic product has been carefully assessed to minimize potential allergic skin reactions. The oil phase consists of *Butyrospermum parkii* (Shea) butter, *Butyrospermum Parkii* (Shea) butter extract, canola oil, coco-caprylate/caprate and C15-19 alkane. The cream does not contain any traditional (and typically irritating) preservatives (as of ones listed under Annex II of the Regulation (EC) No. 1223/2009 of the European Parliament and of the Council on cosmetic products) used in natural product development (like benzyl alcohol, benzoic acid and its sodium salts, glyceryl caprylate, caprylyl glycol, cinnamic acid and derivatives, salicylic acid and its salts). The blinded grader assessed (dermatologist, MD) the skin condition and changes of each participant during obtained by skin analysis performed at baseline and at week 4 visits. Subjects were also asked to perform a self-assessment using DLQI before and after the conduction of the study and to report any adverse effects throughout the study. Subjects are asked to attend dermatologist visits at baseline and after 28 days of product combination use. The participants were asked to apply the washing gel oil (product 1) to the dermatitis/dry face/neck skin in the morning and evening for 28 days. Afterward, participants are requested to apply the product nourishing daily cream (product 2) for restoring and preserving the lipid layer of natural origin on dermatitis/dry face/neck skin. At each visit, the dermatologist evaluates skin dermatological conditions and dermatitis symptoms. Participants were to report any discomfort, skin irritation if it occurred during testing, in which case the testing should be terminated.

The atopic dermatitis symptoms were evaluated as follows: 1. The severity of skin condition in the dimension of skin sensations, measured by a Likert scale from 0 - no feeling to 5 - acute or severe in four dimensions (sting sensation/tingling; burning/heat sensation; heatwave; skin irritation/discomfort/sensitivity) at baseline and 28 days; 2. The severity of skin condition in the dimension of visible skin changes, measured by a Likert scale from 0 - no symptoms to 5 - acute or severe in four dimensions (diffuse redness/flushing; extended vascular networking; rash; edema/swelling) at baseline and 28 days. The participant quality of life changes associated with dermatitis symptoms were evaluated as

follows: DLQI completed during the visit to the dermatologist at baseline and 28 days. Data processing was performed using the statistical data processing program – SPSS (Statistical Package for the Social Sciences), performing descriptive and inferential data analysis via the conduction of the multiple linear regression.

## Results

Results of the participants presented the mean value of the quality of life according to the DLQI evaluation of 6,8605 points before the application of the proposed regimen and 1,5116 points after the application of the proposed regimen. Accordingly, the highest value before the application of the regimen noted is 16,00 points of DLQI and 6,00 points after the application. This signals the overall reduction of the negative symptoms of the participants and overall improvement of the quality of life associated with the skin condition. Mostly before the application of the skincare regimen, the respondents reported the following aspects of the DLQI to be present: Feeling of embarrassment/self-consciousness because of the skin condition (88.37%), itchy, sore, painful or stinging of the skin (72.09%), skin affected any social or leisure activities (74.42%) and problem the treatment for skin been, for example by making home messy, or by taking up time (69.77%). After the application of the skincare regimen in the most impacting aspects of the DLQI a significant decrease was noted: Feeling of embarrassment/self-consciousness because of the skin condition (48.84%), itchy, sore, painful or stinging of the skin (51.16%), skin affected any social or leisure activities (74.42%) and problem the treatment for skin been, for example by making home messy, or by taking up time (20.93%). During the analysis of the results, the multiple linear regression was conducted with the significance level of 0,05 that presented the overall impact of the various aspects on the quality of life. Table 1 presents the significant independent variables out of both regressions.

Table 1  
Symptoms impacting the quality of life associated with skin condition

	Baseline	28 days
Severity of skin condition in the dimension of skin sensations		
sting sensation/tingling	0.8376	-
burning/heat sensation	1.0492	-
heat wave	-	-
skin irritation/discomfort/sensitivity	0.8157	1.1010
Severity of skin condition in the dimension of visible skin changes		
diffuse redness/flushing	-	-
extended vascular networking	1.1363	-
rash	-	-
edema/swelling	1.2864	-

As the according to results present then three aspects out of the severity of the skin condition in the dimension of skin sensations and two out of the severity of skin condition in the dimension of visible skin changes impact the quality of life of the participants. The most significant impact is associated with visual aspects like the extended vascular networking and the edema/swelling. At the same time, the most impacting sensation aspect is the burning/heat sensation participants experience. After the regimen implication in addition to the overall improvement, the least symptoms tend to be associated with the quality of life of the respondents while the only significant impact was noted to be present by the severity of skin condition in the dimension of skin sensations in terms of the skin irritation/discomfort/sensitivity.

During the discussion with the dermatologist, the participants also commented about the overall positive psychological condition based on the reduction of the associated visual symptoms of atopic dermatitis. For the respondents, it was also psychologically more comfortable to use a skin care regimen of the natural origin and the two-step combined regimen did not present any complications to follow during the everyday skincare routine.

## **Discussion**

The multiple comparisons across the various groups of patients signaled that atopic dermatitis patients reported higher scores on the DLQI than patients with other skin diseases [21]. Similarly, it is defined that patients with atopic dermatitis symptoms present an impact of the disease symptoms on the disease-related quality of life [21, 22]. At the same time, the observational study has presented the improvement of the quality of life of the patients after the improvement in the atopic dermatitis symptoms' severity [23], based on the similar correlation between the severity of atopic dermatitis and the quality of life that has been approved in the different similar studies using different questionnaires earlier [24, 25]. Overall, atopic dermatitis places a burden on the affected patients [26], and using the validated methods it is necessary to assess the impact of the treatment or skincare routine on the improvement of the quality of life of the patients. Skincare routine for the patients with atopic dermatitis symptoms is essential while the various studies have reported that the circumspect regimen for the patients with atopic dermatitis has a positive impact on reducing the symptoms. [27] However, the majority of the even natural skincare products aiming at the relief of the atopic dermatitis symptoms are developed using traditional and typically irritating preservative systems or antibacterial agents, e.g. benzyl alcohol, benzoic acid and its sodium salts, glyceryl caprylate, and others [28-34], that being effective ingredients for maintaining the product, tend to often become a problem for a user while causing loss of microbial diversity and leading to the patient experiencing discomfort due to irritation.

Based on the mentioned above the natural two-step regimen is developed to improve the life quality of the patients while reducing the symptoms and the burden placed. In the first product, the antimicrobial properties are ensured with the addition of Lactobacillus ferment – a probiotic-based ingredient created by the fermentation of Lactobacillus. The concentration of surfactants in the final

composition is less than 1.5 % (wt%). The active ingredient composition consists of betaine, ceramide NP, Laminaria Ochroleuca extract and Curcuma Longa root extract. The ceramide NP and betaine are selected in order to help the skin retain moisture. In the second product, the mild antimicrobial system of the product is established and consists of a combination of Lactobacillus ferment, sodium levulinate, sodium anisate, and methylheptylglycerin in order to maintain a healthy skin microbiome. The emulsion base is also free from perfume (which usually are loaded with allergens) that can be harmful to individuals with sensitive and atopic skin. The cream was specifically developed for the relief of symptoms associated with atopic dermatitis. The active ingredients composition of cream consisting of ceramide NP, magnesium carboxymethyl beta-glucan, hydrolyzed jojoba esters, Betaine and Avena sativa (Oat) kernel extract have been found to have protective and healing effects on the skin (improve skin barrier, maintain a moist skin environment, reduce transepidermal water loss), the effectiveness of which has been tested by manufacturers of ingredients.

One more aspect to be considered is the overall level of the information that was noted during the discussions with the dermatologists. It was noted that even with the diagnosed atopic skin condition the knowledge of the respondents regarding the impact of the everyday activities was rather vague. The majority of the respondents associated the impact on the skin mainly by the household items, weather and stress, the same time only some of the respondents emphasized that topical cosmetics may also cause the severity of the symptoms, that goes in line with the studies, showing the low level of the awareness of the real impact of the cosmetics on the sensitive skin [35]. At the same time the participants also stated often that there is no way of easing the symptoms except for the medical treatment and mainly did not consider cosmetics as the way to reduce the symptoms of atopic dermatitis. The participants often supposed that the ease of the symptoms is a short-term effect and the cost associated with the short-term treatment often does not comply with the results that have also mirrored in the broad studies of the attitude of the patients [36]. This also creates a need to raise awareness of the patients informing them regarding the potential improvement of symptoms using the appropriate skincare routine as the results show that often the patients with the highest DLQI has the lack of information and low knowledge level on the supporting methods of the reduction of the symptoms, that may in future be associated with the worsening level of the mental health. [37]

The results approve the improvement of the quality of life that is associated with skin diseases in the majority of the patients. The most significant impact was associated with the visual aspects like the extended vascular networking and the edema/swelling and the most impacting sensation aspect is the burning/heat sensation participants experience. After the regimen implication in addition to the overall improvement, the least symptoms tend to be associated with the quality of life of the respondents while the only significant impact was noted to be present by the severity of skin condition in the dimension of skin sensations in terms of the skin irritation/discomfort/sensitivity.

The study has several limitations: a relatively small number of respondents, which is a constraint to generalise the conclusions. The withdrawal of study

participants can be explained also by the limitations of the COVID-19 pandemic situation. The outbreak of the COVID-19 pandemic was a major limitation of the study that has to be highlighted, as it had a significant influence on all aspects of the life of the study participants and society in general, the exact impacts and their extent remaining unknown. To obtain more profound results, it is recommended to expand the study in order to obtain data over longer periods of time and register the data on cumulative intrinsic and extrinsic environmental factors that constitute an impact pattern and would help to interpret the results better.

## **Conclusion**

The results approve the improvement of the quality of life that is associated with skin diseases in the majority of the patients. The most significant impact was associated with the visual aspects like the extended vascular networking and the edema/swelling and the most impacting sensation aspect is the burning/heat sensation participants experience. After the regimen implication in addition to the overall improvement, the least symptoms tend to be associated with the quality of life of the respondents while the only significant impact was noted to be present by the severity of skin condition in the dimension of skin sensations in terms of the skin irritation/discomfort/sensitivity. The results of the study approve the positive effect of the natural regimen for skincare for the patients with atopic dermatitis in connection with the decrease of the burden implied by the disease in both aspects of the visual and sensory effects that negatively impact the quality of life of the patients. This approves the idea that natural skincare regimen reduces the symptoms of atopic dermatitis, positively impacting the psychosocial condition of the patients.

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Authors declare that the contents of this article are their own original unpublished findings.

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