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Acne vulgaris and treatment with topical retinoids - adapalene and tretinoin

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ABSTRACT

Introduction and purpose:

Acne vulgaris is a disease that mainly affects young people and is associated with overactive sebaceous glands. The disease mainly affects the face but can also occur on the back. Depending on the clinical picture, we can distinguish different types of acne and make our treatment dependent on it.

The aim of the study will be to compare the effects of topical retinoids on acne vulgaris.

State of knowledge:

Topical retinoids have a direct anti-inflammatory effect and prevent the formation of blackheads and microcomedones. Five retinoids are currently available for topical treatment of acne vulgaris. We distinguish three generations. The mechanism of action is not fully understood, but it is known that they react with the RAR and RXR receptors. In the review paper, we will compare the effects of adapalene with tretinoin.

Conclusion: According to the indicated study results, there is no significant difference in the effect of treatment with adapalene or tretinoin. Adapalene showed less irritation during treatment than tretinoin. The most important thing during acne treatment is choosing the right concentration and formulation by the dermatologist so that the patient does not stop treatment.

Keywords: acne vulgaris, topical retinoids, skin, tretinoin, adapalene.

INTRODUCTION

The skin is the largest organ of our body with a layered structure. It is the first barrier that protects the internal organs from the harmful effects of the external environment. The epidermis is its most superficial layer. The lipid coat that covers the surface of the epidermis is a mixture of extrinsic and intrinsic fats, exfoliated keratin and water. Together with the stratum corneum, it is an obstacle to the free penetration of water and other substances in both directions, acting as a hydro-lipid (epidermal) barrier, playing a very important role in the pathogenesis of acne. Under the epidermal layer is the dermis. It consists mainly of connective tissue, collagen and elastic fibers. It contains blood vessels that nourish the upper layers of the skin. It is also characterized by the presence of skin appendages such as sebaceous glands, sweat glands and hair. The main components of the subcutaneous tissue are adipocytes, which are adipose tissue cells, blood vessels and fibrous tissue. [3][4]

Acne vulgaris is a disease that mainly affects young people and is associated with overactive sebaceous glands. Mostly it has a mild course, while in 15% between 11 and 30 years of age it has a severe course, leaving traces in the form of scars and discoloration. Acne is an inflammatory disease, also associated with excessive sebum production and abnormal keratosis of the hair-sebaceous ostia. In the first phase, cells of the immune system and pro-inflammatory cytokines with the ability to multiply keratinocytes, and as a result, the formation of a blackhead, appear in the area of the hair-sebaceous unit. Many factors are now known to aggravate acne, including: stress, sun, hormones, diet, medications and smoking. [2]

Retinoids are vitamin A derivatives or compounds that are structurally/functionally similar to vitamin A. They have the ability to bind to the nuclear receptor and transcribe genes. There are 3 generations of retinoids, distinguished according to their properties and structure. [1]

More than 90% of acne lesions are located on the face and back, and rarely on the chest. The following forms of acne are distinguished: comedonal, papulo-pustular, phlegmonous, keloid as a consequence of acne lesions. Treatment of acne depends on the clinical picture and the health of the patient. We want to remove inflammation and prevent the scarring process. In this disease entity, a very important element is supportive treatment, which will allow us to maintain the

effects of previous treatment. The substance that meets the requirements of basic and maintenance treatment are retinoids. [2]

DESCRIPTION OF THE STATE OF KNOWLEDGE

There are 3 generations of retinoids, distinguished according to their properties and structure. The first (tretinoin, isotretinoin and retinaldehyde) and the third (adapalene and tazarotene) generation of retinoids are used in the treatment of acne. [1][5] The action of retinoids is based on their penetration into the keratinocyte and binding to one of the 4 groups of receptors corresponding to it. This enhances the cellular dynamics of keratinocytes, fibroblasts, Langerhans cells and melanocytes. As a result of increased proliferation of keratinocytes, an improvement in the protective function of the epidermis, reduction of TEWL and protection of collagen against damage are noticed. [1][6][7][8]

The action of retinoids is based on their penetration into the keratinocyte and binding to one of the 4 groups of receptors corresponding to it. This enhances the cellular dynamics of keratinocytes, fibroblasts, Langerhans cells and melanocytes. As a result of increased proliferation of keratinocytes, an improvement in the protective function of the epidermis, reduction of TEWL and protection of collagen against damage are noticed. Their anti-blackhead effect stabilizes the secretion of sebum by the glands. An important issue is the fact that retinoids cause a decrease in the activity of enzymes present in the lipogenesis process. They stop the differentiation and multiplication of sebocytes. [1][9]

Retinoids can be used in monotherapy for the treatment of acne, in combination therapy or to maintain the effects of previous therapy. The formula of the drug base affects the rate and amount of absorption of the active substance. Water- and alcohol-based liquids and gels show the most effective drug delivery. The latest technologies allow the active substance to be enclosed in carriers that reduce the degree of irritation, ensure its longer stability and slow down its release. As the concentration of retinoid increases, its effectiveness increases. It is recommended to apply a thin layer once a day in the evening in the amount of a pea on the entire face. The most important thing during topical retinoid treatment is to explain the process to the patient and provide relevant information to prevent treatment discontinuation. Irritation may occur at the beginning of use, accompanied by erythema and peeling of the skin, which usually lasts the first

few weeks and peaks in the first or second week. From a clinical perspective, this irritation affects the outermost layer of the skin and is rated as mild to moderate. During the first weeks, corneocytes may lose their cohesiveness, which after a few weeks return to their previous state and their correct arrangement, tolerance to the retinoid is developed and irritation subsides.[13] The effectiveness of retinoids in both blackhead and inflammatory acne has been tested. While the former was the main indication for the inclusion of retinoids, Leyden reviewed high-resolution digital images from several hundred individuals and independent researchers assessed the change in severity - lowest at 12 and 15 weeks and demonstrated significant clinical improvement in inflammatory acne as well. [12]

Tretinoin is a topical retinoid. It is available in the form of a cream, gel and liquid. The formula of the base affects the degree of irritation of the patient's skin. Cream will be better tolerated and less irritating than lotion, gel is in between. [10] Comparing concentrations of 0.1% and 0.025% in two separate 12-week studies, the number of micro-comedones was reduced by 80% and 35%, respectively. A proportionally reduced dose-related effect was found when comparing 0.3% adapalene to its 0.1% concentration. [11] Thanks to the action of retinoids on the dermis, an improvement in the structure of the skin has been observed, the reduction of small scars caused by a disturbed balance between the destruction of the matrix and its formation under the control of MMP, and the reduction of pigmentation, i.e. secondary acne lesions. [10][11]

In a randomized study conducted among 268 patients of both sexes with mild to moderate acne vulgaris divided into two groups of 134 people, tretinoin 0.025% gel was used in the first group and adapalene 0.1% gel in the second group. After 12 weeks, the speed of action, the degree of irritation and the overall effect of the therapy were assessed. The result showed that adapalene was as effective as tretinoin after 12 weeks in mild to moderate acne, while adapalene was less irritating to the skin. [14]

In a 12-week, randomized, double-blind study by Tirado-Sanchez, 171 subjects were compared the TLC and skin irritation effects of topical retinoids - 0.3% adapalene, 0.1% adapalene, 0.05% tretinoin, and a placebo. The greatest decrease in TLC (total lesion count) was obtained after using 0.05% tretinoin (76.7%). The effects obtained with the use of adapalene did not differ significantly from the result obtained with tretinoin, as they were 66.4% with 0.3%

adapalene and 57.8% with 0.1% adapalene, respectively. In patients treated with placebo, the decrease in TLC was 21.8%, which proves the beneficial therapeutic effect of the above-mentioned retinoids. [15][16]

SUMMARY

Summarizing the data from clinical trials presented in the article, it can be concluded that the topical application of retinoids in acne is effective in non-inflammatory and inflammatory lesions. Comparing the effectiveness of the presented retinoids, there is no noticeable statistically significant difference in the obtained treatment effects. More important than the type of retinoid seems to be the selection of the appropriate concentration and its formulation. Informing the patient about how to use them, choosing the right care allows you to reduce possible irritation, which is the main side effect, and thus prevent discontinuation of therapy. The information and facts presented in the article confirm that topical retinoids should be the basis of acne treatment, therefore it is important to increase the awareness and knowledge of dermatologists about their beneficial effect on the treatment process. [11]

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