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Skin Moisture Profile of Normal Skin and Inflammatory Skin Disease Using Skin Analyzer

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ABSTRACT

The skin has several functions which related to each other. It consists of 3 layers with EHT epidermis on the top layer. It serves to provide a barrier of protection against skin external threats and has one of the important functions of the skin. The structure of the stratum corneum is the main factor that regulates the transportation of fluid in the skin to retain skin moisture. One of the characteristics of healthy skin is moisture. Dry skin is prone to dermatoses, such as dermatitis. Since skin moisture is important, we need to measure the level of water in the epidermis. The faster the diagnosis, the faster the treatment. This study uses a cross-sectional design, conducted at one of the general hospitals in Pekanbaru. Skin moisture examination was carried out by determining the percentage of water content in the epidermis using a portable skin analyzer on the skin surface of healthy people, and normal (non-lesional skin lesions) of subjects diagnosed with dermatitis. The mean of subjects without dermatoses is 36,4, the non-lesional skin of subjects with dermatoses is 36.4, and the skin lesion of the subject was 12,6. Data were analyzed by t-test. There is a significant difference between non-lesional and lesional skin with a p-value <0,05.

Keywords: Skin moisture, inflammatory skin disease, skin analyzer

Introduction

The skin consists of 3 layers with the epidermis on the top. The layered structure of the epidermis serves to provide a protective skin barrier against threats and is one of the important functions of the skin (Kubo & Amagai, 2019). The structure of the stratum corneum (SC) is the main factor that regulates fluid transport in the skin to maintain skin moisture. there 4 functions of SC, there is the formation of corneocytes, lipids, natural moisturizing factor (NMF), and skin desquamation. Corneocytes are the physical barrier of SC that makes the skin more elastic when hydrated. Natural moisturizing factor maintains the hydration of corneocytes. Lipids of SC serve as chemical barriers. In the desquamation process, desmosome degradation occurs by hydrolytic materials. The dryness of the skin will be visible from the surface of the water content in SC is less than 10%. (Kubo & Amagai, 2019; Rihatmadja, 2015; Goh et al., 2019)

Healthy skin is moist skin with adequate moisture content so that the skin looks smooth and elastic (Lynde, 2001; Verdier-Sevrain & Bonte, 2007). It consists of 3 layers with the epidermis on the top layer. The epidermis serves to provide a barrier of protective skin from external threats and has one of the important functions of the skin. The structure of the stratum corneum is the main factor that regulates the transportation of fluid in the skin to retain skin moisture. One of the characteristics of healthy skin is moisture. Dry skin is prone to dermatoses such as dermatitis. Since skin moisture is important, we need to measure the level of water in the epidermis. The faster the diagnosis, the faster the treatment. This is a cross-sectional study design, conducted at one of the general hospitals in Pekanbaru. The study aims to get the moisture profile of normal and inflammatory skin diseases. The examinations of skin moisture level were carried out by

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determining the percentage of water content in the epidermis using a portable skin analyzer on the skin of healthy people, normal (non-lesional and skin lesion) diagnosed dermatitis subjects. Determination of skin moisture is usually conducted by examination using a non-invasive electrical instrument, e.i. Corneometer. However, a study comparing over-the-counter portable skin analyzers revealed the same results as Corneometer. Since an examination Corneometer is not practical and the price is also expensive, we use a simple and cheaper skin analyzer in this study to compare water content in lesional and non-lesional skin of inflammatory skin disease that has lower moisture levels.

The dryness of the skin often causes skin problems. Some skin diseases associated with it such as atopic dermatitis, discoid dermatitis, and psoriasis Vulgaris. The use of moisturizers for the disease gives good results. The degree of moisture in the skin varies and is determined by many factors such as age, area of the body, temperature, and season (Lynde, 2001; Wassermann et al., 2020; McLafferty et al., 2012). Since skin moisture is important, it is necessary to determine the measurement of water content in the epidermis. By knowing skin moisture, therapy can be carried out earlier and prevention can be done so that it should not become a prolonged skin disease. The faster the diagnoses, the faster the treatment

Material and Methods

Measurement of skin moisture using a skin analyzer

This is a cross-sectional study with the subjects being patients of a general hospital in Pekanbaru who meet the inclusion and exclusion criteria. The Independent variable is normal skin and inflammatory skin disease and the dependent variable is skin moisture level. The steps of measurement are inspection and diagnosis of the skin by a dermatologist, placing the skin analyzer on the surface of the skin. Normal skin is measured in the volar area of the forearm and then let stand for a while until the percentage of water content appears. Skin disease is measured on the lesion and the same area where the lesion exists to get the water content percentage of non-lesional skin. All examination results are recorded in the research status. Data are analyzed using the SPSS program.

Results and Discussion

In this research, we use skin analyzer SK-8. The total subject of this preliminary study is 21. The average age of normal skin subjects is 26-35 years old. The normal skin moisture percentage means 36,4% water content. The moisture percentage of non-lesional skin is 37,04% and lesional skin is 12,06% as presented in table 1. The level of skin moisture with other portable skin analyzer has four results as follow: <33% is very dry skin; 34-37% is dry skin, 38-42% is normal skin and 43-46% is ideally skin moist. Based on that result, the level of skin moisture of normal skin without dermatoses is categorized as dry skin. It is necessary to do further study to observe the underlying factors of it. Among the various factors, it is assumed that the main factor is the weather or climate since we all know that the temperature in Pekanbaru is hot. Lesional skin moist and non-lesional skin moist percentage is analyzed by paired t-test, with p-value <0,05. Some inflammatory skin diseases, for example, discoid or nummular dermatitis, atopic dermatitis, and irritant contact dermatitis are related to dry skin. Nummular dermatitis is associated with lower hydration of SC, atopic dermatitis is caused by the downregulation of cornified envelope genes, reduced ceramide levels, and enhanced transepidermal water loss. In irritant contact dermatitis, climate also affects the disease. It influences the rapidity of wet-to-dry-cycles. In low ambient humidity, water evaporates rapidly causing uneven surface change. This condition is a common cause of this disease in the setting of genetic predisposition to the impaired barrier.

Table 1. Analysis test of lesional and nonlesional skin

	Moisture		P value*
	Lesion	Nonlesion	
Mean±SD	37,04±4,78	12,06±1,46	<0,001

**paired t-test*

Conclusion

The skin moisture percentage mean of normal skin is categorized as dry skin. This condition could be influenced by climate factors. There are significantly different between lesional and nonlesional skin with p-value <0,05%.

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