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SKIN PH LEVEL IN DIFFERENT FORMS OF ACNE

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The study included 102 patients with various forms of acne who were treated as outpatients and inpatients in a skin hospital based at the Tashkent Medical Academy. Patients were monitored for 6 months from the onset of the underlying disease. All patients with various forms of acne were analyzed the pH level of the face at five points: the forehead, both cheeks, nose and chin.

Key words: acne, pH-metry.

According to Nast et al. 2019 acne occurs in different age categories, so it can be divided into acne in teenagers or early acne and late acne [1,2].

It is generally believed that acne in most adolescents goes away after puberty. In Western countries, acne persists until the age of 20 and 30 in approximately 60% and 40% of people, respectively. Early acne can occur from birth to age 25 [3,4]. Late-onset acne is a common condition that is often defined as acne occurring after the age of 25, divided into persistent acne, which is a continuation of acne from adolescence into adulthood, and late-onset acne, which occurs after the age of 25 [1, 5,6].

Many studies have shown that late-onset acne predominantly affects women. The vast majority (>90%) of women with adult acne have comedones on their faces. The most common predominant sites of involvement are the cheeks, chin, temples and mandibular region. In patients with late forms of acne, the number of comedones, the total number of acne lesions and the proportion of comedones in the lesion were significantly less than in patients with early forms of acne [7,8].

There are many studies showing that dietary components increase the risk of acne, which have shown that diets with a low glycemic index can reduce the severity of acne. There is a possible link between dairy consumption and acne that requires more careful study. The connection between smoking and the occurrence of acne has not been proven [9,10].

There are 2 types of skin lipids, lipids synthesized directly by skin cells and sebum, sebum lipids. Sebum is not sebum. It is critical to understand that normal sebum in people without acne and sebum in people with acne differ in quantity and quality. Sebum secretion is generally considered to be an important factor in the development of acne vulgaris. An increase in sebum secretion during puberty is a prerequisite for the pathogenesis of acne [11]. Almost all acne patients suffer from seborrhea. Acne does not occur when sebum secretion is low. The sebum suppressive efficacy of systemic isotretinoin and antiandrogens confirms the importance of sebum in the pathogenesis of acne.

Cumulative data from several studies indicate that the predicted sebum reduction required to achieve a 50% reduction in acne ranges from 30 to 50% [6].



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It is common knowledge that the pH of the skin is typically acidic, ranging from pH 4–6, while the internal environment of the body maintains a pH close to neutral (7–9). This creates a large pH gradient of 2–3 units between the stratum corneum and the underlying epidermis and dermis. Historically, the physiological role of the acidic skin surface was thought to be a defense mechanism against invading microorganisms. Consequently, there is a broader understanding of the importance of pH in relation to skin function and integrity [3].

The role of the stratum corneum as a permeability barrier depends on its hydrophobic nature, lipid distribution, and lipid organization as a series of lamellar bilayers. The processing of lipids secreted by lamellar bodies and the formation of lamellar structures require an acidic environment. In addition, an acidic environment is required for the production of antimicrobial peptides in sebocytes, which are powerful antibiotics of the innate immune system [5].

Studies in both mice and humans support the claim that pH influences barrier function. In vivo studies in hairless mice exposed to acetone or adhesive film removal showed faster recovery of barrier function in the presence of an acidic buffer solution compared to a neutral buffer solution. Finally, studies have shown that increased pH in normal skin creates a compromised barrier associated with increased serine protease activity and decreased activity of ceramide-forming enzymes.

The skin microflora consists of transient, temporarily inhabiting and permanently inhabiting species, including coagulase-negative staphylococci. Normal flora growth is optimal at acidic pH levels, whereas pathogenic bacteria such as S. aureus thrive at neutral pH levels [3].

There are many studies showing a relationship between increased pH and the development of acne, as well as studies that contradict this statement. So Prokash et al. 2017 showed the presence of a correlation between an increase in skin pH in patients with acne in relation to controls in 200 patients [8]. A study by Kim et al. 2006 showed the absence of any relationship in the pH level of the skin surface in 37 patients with acne [7].

Human skin contains water molecules and therefore has its own acid-base balance (pH), which changes depending on the condition of the skin. In other words, pH is the ratio of acid and alkaline on the surface of the skin.

The pH value can vary from 0 to 14. Scientific studies of large groups of people have shown that the pH parameters of the skin surface can vary in the range from 4 to 7. At the same time, a direct dependence of the pH level on our skin type has been established. Oily skin is characterized by a level from 5.7 to 7, which indicates a dominant alkaline environment. Levels from 4 to 5.2 are typical for dry skin, where an acidic environment prevails. Normal pH values are 5.2 -5.7. The optimal pH balance of the skin is 5.5.







Rice. 1. pH meter with calibration buffer

And it is precisely with this indicator that the skin's high resistance to bacteria, infections and other external irritants is ensured.

Materials and methods: The pH value is determined by the level of hydrogen ions (H+, protons) and hydroxide ions (OH-) during the dissociation of water: H20 = H+ + OH- The pH level was measured with a glass electrode (Fig. 1). The glass electrode is normally filled with an internal buffer (Hg/Hg2Cl2 or Ag/AgCl).

Before each study, the electrode was calibrated with special calibration solutions prepared in advance using pH powder (with a pH level of 4.0, pH 6.86 and pH 9.18). The electrode sensor was washed in distilled water before each study.

Before measurement, the electrode sensor was placed strictly perpendicular to the surface of the skin with light pressure. After pressing the button, a measurement will be taken, which will be recorded in the individual patient record. pH measurements were carried out on the skin of the face, back, chest, neck, and shoulders.

Interpretation of the results: acidic environment - \leq 5.2 units, normal 5.2-5.7 units, alkaline \geq 5.7.

Study: Our study included 102 patients with various forms of acne. Of these, there were 44 men and 58 women - 43.1% and 56.9%, respectively. The study was conducted in compliance with moral and ethical principles and a voluntary consent to participate procedure.

The average age of men was 23.6±4.1 and ranged from 14 to 36 years, and the average age of women was 22.4±3.6 and ranged from 13 to 37 years. The distribution of patients with acne, taking into account gender and age, is shown in Figure 3.1.

The overwhelming number of patients were aged from 21 to 30 years (41.5 and 43.2%, respectively); there was no significant difference by gender (p>0.05). In the age group of 13-20 years, there was a significant predominance of women over men (f - 30.1%, m - 24.8%) (p <0.05).

All patients were assessed for acne severity using the DIA method. The distribution of patients according to the severity of acne depending on the gender of the patients is shown in Table 1.

Table 1



Assessment of the severity of acne using the DIA system (n=102)

Severity	Acne Diagnostic Index (ADI)				Total		
	Men		Women				
	Overall	%	Overall	%	Overall	%	
Easy(0-5)	21	42	29	58	50	49,1	
Average	14	41,2	20	58,8	34	33,3	
(6-10)							
Heavy	9	50	9	50	18	17,6	
(11-15)							
Total	44	43,2	58	56,8	102	100	

The table shows that when assessing the severity of acne, 49.1% of patients had mild acne, 33.3% had moderate and 17.6% had severe acne. Moreover, with mild (ratio 58 to 42%) and moderate (58.8 to 41.2%) degrees of severity, the number of women exceeded men, and with severe severity this ratio was equal (50 to 50%), respectively.

The distribution of patients with acne vulgaris by clinical forms and severity is shown in Table 2.

The table shows that the comedonal form of acne was observed in 36 patients of mild and moderate severity, and the number of patients with mild severity differed significantly from the moderate severity p < 0.001.

Table 2.

Distribution of patients with acne vulgaris by clinical forms and severity (n=102)

severity of the	men		woman		total	
NFNFACE	abs.	%	abs.	%	abs.	%
comedonal form		I				I
easy	12	40%	18	60%	30	29,4%
average	4	66,7%	2	32,3%	6	5,9%
papulopustular form						l
easy	9	45%	11	55%	20	19,6%
average	10	35,7%	18	64,3%	28	27,5%
heavy	4	44,4	5	55,6	9	8,8%
conglabate form	<u> </u>	I				I
heavy	5	55,6	4	44,4	9	8,8%

We studied the pH state in various areas of the facial skin (chin, both cheeks, nose, and forehead) in patients with varying degrees of acne severity.



The results of the pH level in various areas of the skin (neck, back, shoulder, forearm, chest) in the control group showed that the average value was 5.46 ± 0.18 .

In case of mild acne in the studied lesions, there was a significant increase in skin pH relative to the control group and averaged 6.23 ± 0.30 , p<0.05, respectively. The highest pH value in the forehead area is 6.31 ± 0.37 .

With moderate severity of acne in the studied lesions, a significant increase in skin pH was observed relative to the control and averaged 6.25 ± 0.27 , p<0.05, respectively. The highest pH value in the forehead area is 6.34 ± 0.31 .

Finally, in patients with severe acne, a significant increase in skin pH was observed in the studied lesions relative to the control and averaged 6.31 ± 0.26 , p<0.05, respectively. The highest pH value was also observed in the forehead area - 6.54 ± 0.34 .

Table 3

рΗ	parameters	of different	areas of fa	cial skin	in patients	with acne
	1				L	

Skin areas	Control group (n=30)	Easy (n=50)	Average (n=34)	Heavy (n=18)
	(1 00)	(1 00)		(1 10)
Chin	5,42±0,15	6,16±0,29 *	6,19±0,25 *	6,24±0,23 *
Right neck	5,46±0,13	6,28±0,34 *	6,31±0,30 *	6,41±0,31 *
Left neck	5,43±0,14	6,19±0,31 *	6,22±0,28 *	6,29±0,24 *
Forehead	5,49±0,24	6,31±0,37 *	6,34±0,31 *	6,54±0,34 *
Nose	5,46±0,21	6,19±0,28 *	6,22±0,25 *	6,27±0,19 *
Averages	5,46±0,18	6,23±0,30 *	6,25±0,27 *	6,31±0,26 *

Note: The difference is significant - u - Student's test (p <0.05) compared with the indicator: * in the control group; 11 with 2 group; 2 2 with 3 group; 3 1 with 3 group;.

pH values did not differ significantly between patients of different degrees of severity of anke at all study sites.

Consequently, in the 3 study groups of patients with acne, we observed a significant increase in skin pH values directly in the studied areas relative to control values, which is most likely due to increased sebum production in the studied areas of the skin. However, no significant differences were observed between the study groups, which indicates that there is no connection between an increase in skin pH levels and the severity of the skin process.

Conclusions: Thus, in patients with acne, both mild, moderate and severe, there is an increase in skin pH, which is most likely a consequence of increased sweating in hot climates and impaired metabolic processes caused by the activity of P. acnes and accompanying microorganisms. On the other hand, an increase in pH, helping to reduce the bacteriostatic properties of the skin and increased contamination of gram-negative pathogenic flora, closes the pathogenetic circle of acne persistence.

146



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