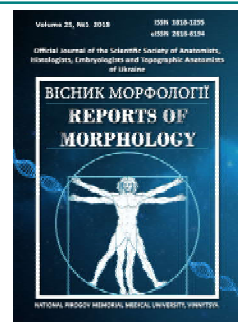




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Signs of palmar dermatoglyphics as markers of atopic diseases

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The family character of atopic conditions, confirmed by many studies, has become the basis for the use of the method of dermatoglyphics to clarify the genetic nature of the "atopic march". The purpose of the study was to identify differences in the features of palmar dermatoglyphics between patients with atopic dermatitis, allergic rhinitis and bronchial asthma. Primary indexes of palmar dermatoglyphics of young men and young women patients with atopic dermatitis, allergic rhinitis and bronchial asthma were taken from the data bank of the research center of National Pirogov Memorial Medical University, Vinnytsya. According to the method of Cummins H. and Midlo Ch. dermatoglyphic study of 320 young men and young women with allergic rhinitis (n = 69), bronchial asthma (n = 108) and atopic dermatitis (n = 143) was performed. Quantitative indices of palmar dermatoglyphics were subject to analysis. The results obtained were processed using the Statistica 6.1 license package using non-parametric methods. It is established that the differences of quantitative indices of palmar dermatoglyphics between young men / young women with atopic dermatitis and allergic rhinitis cover 50.0% / 66.67%; among patients with atopic dermatitis and bronchial asthma - 38.89% / 33.33%; among patients with allergic rhinitis and bronchial asthma - 22.22% / 55.56% respectively. Thus, in young men, the marker potential for signs of palmar dermatoglyphics in the prognosis for the development of bronchial asthma in the presence of allergic rhinitis (22.22%) or atopic dermatitis (38.89%) are insignificant compared with the prognosis for the development of allergic rhinitis in the presence of atopic dermatitis (50.0%). In young women, the marker features of palmar dermatoglyphics in the prognosis for the development of bronchial asthma in the presence of atopic dermatitis are insignificant (33.33%) compared with the prognosis for the development of bronchial asthma in the presence of allergic rhinitis (55.56%) and the prognosis for the development of allergic rhinitis (66.67%).

Keywords: palmar dermatoglyphics, atopic dermatitis, bronchial asthma, allergic rhinitis.

Introduction

Dermatoglyphics (from ancient Greek δέρμα "skin" and γλύφω "carving") is a section of morphology that studies specific patterns on the skin of hands and feet formed by ridges. Dermatoglyphic features have long been used in various fields: in medicine - as a marker of many chromosomal and multifactorial diseases [1, 19]. Also features of human skin image are used in such fields as criminalistics and forensic medicine [16].

A striking example of multifactorial diseases are atopic dermatitis (AD), bronchial asthma (BA), and allergic rhinitis (AR), which are chronic inflammatory processes that underlie both exogenous and endogenous factors [3, 20]. There is still no consensus among scientists about the key trigger mechanism in the pathogenesis of these

diseases [17, 30, 31].

The prevalence of these diseases covers the whole world. Up to 65.0 % of people with AD have their first symptoms from the age of 18 months. By the age of 7, only half of patients have complete disease completion and only 60.0 % have completed disease by adulthood. In addition, about in 30.0 % of AD patients develop asthma [26]. A 2001-2005 study of British scientists found that frequency of asthma had decreased in all patients ((2001: 6.9 (95.0 % CI 6.8-7.0); 2005: 5.2 (95.0 % CI 5.1-5.3) per 1000 patient years, $p < 0.001$)). However, the prevalence rate of BA in adulthood increased (15-44 years: 23.3 %; 45-64 years: 27.7 %; over 65 years: 21.5 %) [24].

However, it is unambiguously proved that the human

constitution influences both the risk of occurrence and the manifestation and severity of these diseases [10, 18, 22, 23, 27, 28]. Jo Y.M. and Yi J.S. [12], in a study of a sample of schoolchildren, found a relationship between the onset of AR and gender, high school class, living space, stress level, vegetable consumption, and sleep satisfaction.

266 AD patients and 532 healthy individuals were examined in Harbin, China. The study found that obesity was significantly correlated with the presence of the disease (OR = 3.2, 95.0 % CI: 1.8, 5.7). Men and women had similar associations (OR = 3.1 for men and 3.2 for women) [15].

Holguin F. et al. [11] investigated the effect of weight on asthma. The study population was 1,049 individuals, 48.0 % of whom had late asthma (≥ 12 years) and 52.0 % had asthma at an early age (< 12 years). Compared with patients with obesity with asthma after 12 years, patients with obesity and with asthma up to 12 years had worse rates.

In particular, studies have been conducted by foreign authors from different parts of the world to study the features of skin pattern in individuals suffering from these diseases.

A group of researchers from India [25] conducted a study to identify specific dermatoglyphic markers of susceptibility to asthma. It was found that such persons are characterized by: decrease in the number of arches, increase in the number of ulnar loops in comparison with the control group was revealed as a result of the study.

In addition, similar studies have been performed for other diseases such as psoriasis, vitiligo, and focal alopecia [14, 21]. The features of dermatoglyphic pattern in AD, BA and AR among the population of Ukraine is still a poorly understood topic [4], and therefore requires more detailed data collection and analysis.

The *purpose* of the study is to identify differences in the features of palmar dermatoglyphics between patients with AD, AR and BA.

Materials and methods

From National Pirogov Memorial Medical University, Vinnytsya Research Center obtained primary indexes of palmar dermatoglyphics in patients with AR, BA and AD of young men and young women. In previous studies, these results have been used when compared with healthy young men and young women [2, 6, 8]. The diagnosis of AD was consistent with conventional methods [9], the diagnosis of BA - according to the recommendations of the International Expert Group EPR-2, and the AR - according to the recommendations of ISSA. Dermatoglyphs of 36 young men and 33 young women with AR were studied; 63 young men and 45 young women with BA; 64 young men and 79 young women with AD.

The analysis of quantitative indices of palmar dermatoglyphics was performed according to the method of Cummins H. and Midlo Ch. [5]. Determined the size of the angles $\angle atd$, $\angle ctd$, $\angle atb$, $\angle btc$, $\angle dat$; the length of the segment c-t; ridge count ab, bc; Cummins index was

determined based on the stroke of the major palmar lines A and D.

The results obtained were processed using the Statistica 6.1 license package using non-parametric methods.

Results

Significant differences or trends of differences in the quantitative indices of palmar dermatoglyphics between patients with AR, BA and AD (Table 1) were established.

When comparing the quantitative indices of the palmar dermatoglyphics of *young men with AR with patients with BA*, significant differences were found in the size of the inner angles $\angle btc$ and $\angle ctd$ of the left palm, as well as - in the course of the main palmar lines, which was reflected in larger values of Cummins index of both palms in patients with AR. Thus, of the 18 indices of both palms analyzed, 4 of them showed significant differences between young men with AR and BA (see Table 1).

In *young men with AR compared with AD patients*, the ridge count a-b of both palms, the dimensions of the inner angles $\angle atb$ of the left palm, $\angle ctd$ and the total angle $\angle atd$ of both palms are significantly smaller and the inner angle $\angle btc$ is larger. Thus, out of 18 indices of both palms analyzed, 9 of them showed significant differences between young men with AR and AD (see Table 1).

When comparing the quantitative indices of the palmar dermatoglyphics of *young men with AD compared with patients with BA*, the dimensions of the internal angles $\angle atb$, $\angle ctd$ and the total angle $\angle atd$ and Cummins index of both palms are significantly smaller. Thus, out of 18 indices of both palms analyzed, 7 of them showed significant differences between young men with AD and BA (see Table 1).

When comparing the quantitative indexes of the palmar dermatoglyphics of *young women with AR with patients with BA*, it is found that the dimensions of the inner angles $\angle btc$ of the right palm, $\angle atb$ and the total angle $\angle atd$ of both palms are significantly smaller. In this case, the length of the line connecting the triradi ∇c and the axial ∇t of the left palm and the Cummins index of the right palm are significantly larger, and the ridge count a-b of both palms and b-c of the right palm are significantly smaller. Thus, of the 18 indices of both palms analyzed, 10 of them showed significant differences between young women with AR and BA (see Table 1).

In *young women with AR compared with patients with AD*, the ridge count a-b of both palms, the dimensions of the inner angles $\angle atb$, $\angle ctd$ and the total angle $\angle atd$ of both palms are significantly smaller, and the angle $\angle dat$ and the length of the segment c-t of both palms are larger. Thus, of the 18 indices of both palms analyzed, 12 of them showed significant differences between young women with AR and AD (see Table 1).

When comparing the quantitative indexes of the palmar dermatoglyphics of *young women with AD compared with*

Table 1. Quantitative indices of palmar dermatoglyphics in Podillia people of different gender with AR, BA and AD ($M \pm \sigma$).

Indicator	Gender	Patients with AR ($n_M=36$, $n_F=33$) (1)	Patients with BA ($n_M=63$, $n_F=45$) (2)	Patients with AD ($n_M=64$, $n_F=79$) (3)	P_{1-2}	P_{1-3}	P_{2-3}
R - ATD (degrees)	M	40.97±4.90	41.57±5.88	43.91±7.27	>0.05	<0.05	<0.05
	F	40.60±4.75	44.13±5.35	44.56±5.86	<0.01	<0.001	>0.05
L - ATD (degrees)	M	40.85±4.14	40.47±5.52	43.44±7.12	>0.05	<0.05	<0.01
	F	40.61±4.25	44.08±5.17	45.38±6.18	<0.01	<0.001	>0.05
R - CTD (degrees)	M	13.76±4.19	14.34±4.66	16.95±3.82	>0.05	<0.001	<0.001
	F	14.97±2.92	15.97±3.94	16.96±3.20	>0.05	<0.01	>0.05
L - CTD (degrees)	M	13.68±3.94	16.01±5.37	16.23±3.61	<0.05	<0.01	>0.05
	F	16.00±2.82	17.17±3.36	17.43±3.43	>0.05	<0.05	>0.05
R - ATB (degrees)	M	15.79±2.99	15.88±2.80	16.86±2.68	>0.05	=0.069	<0.05
	F	14.94±3.53	16.86±3.31	17.04±2.82	<0.05	<0.01	>0.05
L - ATB (degrees)	M	15.64±2.66	15.81±2.81	17.50±3.05	>0.05	<0.01	<0.01
	F	14.39±3.17	17.20±3.45	18.11±3.08	<0.001	<0.001	>0.05
R - BTC (degrees)	M	11.73±2.88	10.63±2.98	10.50±2.46	=0.077	<0.05	>0.05
	F	10.69±2.62	13.06±2.68	10.82±2.21	<0.001	>0.05	<0.001
L - BTC (degrees)	M	11.74±3.23	9.95±2.33	10.20±2.71	<0.01	<0.05	>0.05
	F	10.34±3.08	11.13±2.70	10.34±2.48	>0.05	>0.05	>0.05
R - DAT (degrees)	M	58.68±5.24	57.22±6.25	57.30±5.93	>0.05	>0.05	>0.05
	F	59.77±4.99	61.00±6.58	56.19±5.66	>0.05	<0.01	<0.001
L - DAT (degrees)	M	58.18±4.32	58.98±5.33	58.20±5.72	>0.05	>0.05	>0.05
	F	58.22±3.99	60.24±7.58	55.94±5.21	>0.05	<0.05	<0.001
R - CT (mm)	M	74.97±9.76	76.54±8.37	76.07±10.95	>0.05	>0.05	>0.05
	F	73.83±8.09	71.20±8.19	69.27±9.57	>0.05	<0.05	>0.05
R - CT (mm)	M	74.71±8.48	77.85±7.45	76.39±10.45	=0.058	>0.05	>0.05
	F	74.29±6.11	70.31±9.62	68.50±9.87	<0.05	<0.01	>0.05
R - AB (absolute units)	M	36.55±6.60	38.82±6.05	40.09±6.20	=0.086	<0.01	>0.05
	F	33.56±8.69	40.53±7.40	40.95±5.89	<0.001	<0.001	>0.05
L - AB (absolute units)	M	37.94±8.07	39.74±7.41	41.30±5.85	>0.05	<0.05	>0.05
	F	33.94±10.58	41.31±9.29	41.41±5.41	<0.01	<0.001	>0.05
R - BC (absolute units)	M	28.27±5.45	26.87±4.62	27.50±6.21	>0.05	>0.05	>0.05
	F	27.06±6.47	32.02±6.19	27.60±5.62	<0.001	>0.05	<0.001
L - BC (absolute units)	M	28.90±5.36	26.77±5.21	27.11±5.81	=0.056	>0.05	>0.05
	F	26.77±6.26	28.77±5.56	26.90±5.52	>0.05	>0.05	=0.073
R - I (absolute units)	M	8.600±1.886	5.910±1.780	9.281±1.713	<0.001	=0.069	<0.001
	F	8.743±1.597	5.200±1.590	8.899±1.959	<0.001	>0.05	<0.001
L - I (absolute units)	M	7.065±1.948	4.050±1.940	7.641±1.811	<0.001	>0.05	<0.001
	F	8.083±2.089	8.480±2.070	7.595±1.978	>0.05	>0.05	<0.05

Notes: ATD - atd angle value; CTD - ctd angle value; ATB - atb angle value; BTC - btc angle value; DAT - dat angle value; CT - the distance between the palmar triradi c and t; AB - palmar ridge count a-b; BC - palmar ridge count b-c; I - Cummins index; R - right palm; L - left palm.

patients with BA, it is found that the ridge count b-c and the dimensions of the inner angle $\angle btc$ of the right palm, as well as the angle $\angle dat$ of both palms are significantly smaller, and Cummins index of both is significantly larger.

Thus, out of 18 indices of both palms analyzed, 6 of them showed significant differences between young women with AD and BA (see Table 1).

Discussion

AD, AR, and BA in 80.0 % of cases are a family syndrome associated with genetic defects [13]. It is known that the risk of developing AD is 60.0-80.0 % in a child if both parents have atopic diseases [29]. Polygenic control of the pathogenetic mechanisms of atopy is envisaged [7], which includes the combined influence of both genes responsible for the body's immune response to antigen and genes responsible for the structure of organs that perform barrier function with the environment.

A number of authors have revealed diagnostic and prognostic signs of the development of AD by comparing palmar dermatoglyphics in patients with AD in the stage of remission with healthy peers, to which the young men attributed combinations of the following signs: angles $\angle atd$, $\angle ctd$, $\angle atb$, segment a-d; ridge count a-b, b-c and c-d on both palms with high values; Cummins index of the left palm with low values; in young women - angles $\angle atd$, $\angle ctd$, $\angle atb$ on both palms and $\angle bts$ on the right palm with high values; segment a-d, ridge count a-b, b-c on both palms and c-d on the right palm with high values and segment c-t on both palms with smaller values [6].

Year-round rhinitis in young women is known to be associated with a narrower angle $\angle atb$ and in sick young men with a wider angle $\angle atb$ in both palms compared to the mean population values, and in both of them with a wider angle $\angle dat$ at right palm accompanied by low Cummins index values [2].

According to Gunas I.V. and others [8], palmar dermatoglyphics of patients' young men with asthma compared to healthy peers are represented by Cummins index with low values, palm angles $\angle dat$ and $\angle atd$ and ridge count a-b and b-c with higher values.

The results obtained by dermatoglyphics indirectly confirm the presence of a tendency to develop diseases of atopic nature. Thus, it is shown that the largest number of significant differences in quantitative indices of palmar dermatoglyphics were recorded between *patients with AR and patients with AD* both young men (50.0 %) and young women (66.67 %). Moreover, these differences are almost unidirectional in nature regardless of sex and are found in the radial and ulnar areas of the palm, which is related to the

peculiarities of localization of the palm triradii ∇a , ∇b , ∇c , ∇d . It should be emphasized that the differences in the dimensions of the angles refer to both the internal and the overall angle $\angle atd$.

Almost the same number of significant differences in the quantitative indices of palmar dermatoglyphics were recorded between *AD patients* and *BA patients* both young men (38.89 %) and young women (33.33 %), but they were different in nature. Thus, the differences between young men are recorded in the ulnar and radial regions of the palm, and in young women - in the medial region of the palm; young men have differences about the size of both internal and overall angles of $\angle atd$, while in young women - only internal angles.

Finally, the differences between the *patients with AR* and the *patients with BA* young men (22.22 %) and young women (55.56 %) are quite different in both quantitative and localization of changes. The differences in young men are found in the ulnar and medial regions of the left palm, and do not include the size of the total angle $\angle atd$, and in young women - radial region of both palms and the medial region of the right palm, and include the total angle $\angle atd$ of both palms.

In general, the differences in the quantitative indices of palmar dermatoglyphics between patients with AD, AR and BA were found to be more pronounced in young women than in young men, which is in the logical context of the statement regarding the more frequent connection with atopic diseases on the maternal line (60.0-70.0 %) than according to the father [29].

Conclusions

1. In young men, the marker potential for signs of palmar dermatoglyphics in the prognosis of the development of BA in the presence of AR (22.22 %) or AD (38.89 %) are insignificant compared with the prognosis of the development of AR in the presence of AD (50.0 %).

2. In young women, the marker potential of the features of palmar dermatoglyphics regarding the prognosis of BA in the presence of AD are insignificant (33.33 %) compared with the prognosis of BA in the presence of AR (55.56 %) and the prognosis of the development of AR in the presence of AD (66.67 %).

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ОЗНАКИ ДОЛОННОЇ ДЕРМАТОГЛІФІКИ ЯК МАРКЕРИ ЗАХВОРЮВАНЬ АТОПІЧНОЇ ПРИРОДИ

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Сімейний характер atopічних станів, підтверджений даними багатьох досліджень, став підставою для застосування методу дерматогліфіки задля уточнення генетичної природи "atopічного маршу". Мета дослідження - виявити розбіжності ознак долонної дерматогліфіки між хворими на atopічний дерматит, алергічний риніт та бронхіальну астму. Первинні показники долонної дерматогліфіки юнаків і дівчат, хворих на atopічний дерматит, алергічний риніт та бронхіальну астму взяті з банку даних науково-дослідного центру Вінницького національного медичного університету ім. М.І. Пирогова. За методикою Cummins H. і Midlo Ch. проведено дерматогліфічне дослідження 320 юнаків і дівчат, хворих на алергічний риніт (n=69), бронхіальну астму (n=108) та atopічний дерматит (n=143). Аналізу підлягали кількісні показники долонної

дерматогліфіки. Отримані результати оброблені за допомогою ліцензійного пакета "Statistica 6.1" з використанням непараметричних методів. Встановлено, що розбіжності кількісних показників долонної дерматогліфіки між юнаками / дівчатами, хворими на atopічний дерматит й алергічний риніт охоплюють 50,0% / 66,67%; між хворими на atopічний дерматит та бронхіальну астму - 38,89% / 33,33%; між хворими на алергічний риніт та бронхіальну астму - 22,22% / 55,56% відповідно. Таким чином, у юнаків маркерні можливості ознак долонної дерматогліфіки щодо прогнозу розвитку бронхіальної астми при наявності у них алергічного риніту (22,22%) або atopічного дерматиту (38,89%) є незначними порівняно з прогнозом розвитку алергічного риніту при наявності atopічного дерматиту (50,0%). У дівчат маркерні можливості ознак долонної дерматогліфіки щодо прогнозу розвитку бронхіальної астми при наявності atopічного дерматиту є незначними (33,33%) порівняно з прогнозом розвитку бронхіальної астми при наявності алергічного риніту (55,56%) та прогнозом розвитку алергічного риніту при наявності atopічного дерматиту (66,67%).

Ключові слова: долонна дерматогліфіка, atopічний дерматит, бронхіальна астма, алергічний риніт.

ПРИЗНАКИ ЛАДОННОЙ ДЕРМАТОГЛИФИКИ КАК МАРКЕРЫ ЗАБОЛЕВАНИЙ АТОПИЧЕСКОЙ ПРИРОДЫ

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Семейный характер atopических состояний, подтвержденный данными многих исследований, стал основанием для применения метода дерматоглифики для уточнения генетической природы "atопического марша". Цель исследования - выявить расхождения признаков ладонной дерматоглифики между больными atopическим дерматитом, аллергическим ринитом и бронхиальной астмой. Первичные показатели ладонной дерматоглифики юношей, больных atopическим дерматитом, аллергическим ринитом и бронхиальной астмой взяты из банка данных научно-исследовательского центра Винницкого национального медицинского университета имени Н.И.Пирогова. По методике Cummins H. и Midlo Ch. проведены дерматоглифические исследования 320 юношей, больных аллергическим ринитом (n = 69), бронхиальной астмой (n = 108) и atopическим дерматитом (n = 143). Анализу подлежали количественные показатели ладонной дерматоглифики. Полученные результаты обработаны с помощью лицензионного пакета "Statistica 6.1" с использованием непараметрических методов. Установлено, что различия количественных показателей ладонной дерматоглифики между юношами / девушками, больными atopическим дерматитом и аллергическим ринитом охватывают 50,0% / 66,67%; между больными atopическим дерматитом и бронхиальной астмой - 38,89% / 33,33%; между больными аллергическим ринитом и бронхиальной астмой - 22,22% / 55,56% соответственно. Таким образом, у юношей маркерные возможности признаков ладонной дерматоглифики по прогнозу развития бронхиальной астмы при наличии у них аллергического ринита (22,22%) или atopического дерматита (38,89%) незначительны по сравнению с прогнозом развития аллергического ринита при наличии atopического дерматита (50,0%). У девушек маркерные возможности признаков ладонной дерматоглифики по прогнозу развития бронхиальной астмы при наличии atopического дерматита незначительны (33,33%) по сравнению с прогнозом развития бронхиальной астмы при наличии аллергического ринита (55,56%) и прогнозом развития аллергического ринита при наличии atopического дерматита (66,67%).

Ключевые слова: ладонная дерматоглифика, atopический дерматит, бронхиальная астма, аллергический ринит.
