

THE CONNECTION THE DERMATOGLYPHIC OF FINGERS
AND HUMAN'S GROWTH

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Resume.The identification of an unknown person remains one of the most important areas of forensic medicine. The use of simple and materially nonburdensome research methods can accelerate the process of identifying common anthroposcopic and anthropometric parameters of a person. Dermatoglific parameters of distal, middle and proximal phalanges of fingers are stable phenotypic features of a person, which correlate with other parameters of it. Obtained using modern scanners dermatoglific parameters are already digitized and are subject to rapid processing of modern computer programs. The conducted research allowed to establish the correlation between the dermatological signs of fingers and the height of the female population of Hutsul, Lemko and Boyko ethno-territorial groups. Correlation ties between dermatoglyphic parameters of distal, middle and proximal phalanges of hands and anthropometric parameters were sufficiently informative, which allowed them to be used in the prediction of foreign-recognizable features of a person.

Key words: dermatoglyphics, height.

Introduction. Finger dermatoglyphics of the hand and the foot, or finger dermatoglyphic patterns (FDP), represent a unique morphological phenomenon, which attracts the attention of scientists of various theoretical and applied areas of science. FDP are widely using in addressing the key issues of anthropology [1], ethnology [2], criminology [3,4,5,6], developmental biology [6,7,8], developing computer methods of image recognition of biological objects [4 , 9,10], etc. Finger dermatoglyphs are an integral element of the broader concept of human dermatoglyphic constitution [11], which includes not only skin patterns of fingers, palms, feet, but also of the entire surface of the human skin [12]. At the same time, FDP - an integral element of the local constitution of fingers, an individual relief of the receptor field of the sensory tactile organ [12]. The complex structure and varied vicissitudes of FDP is the main feature, it allows us to widely use this feature in scientific and applied research of human variability not only in morphology, but also in related fields. FDP human hand during morphogenesis and laying are influenced by many factors. For a skilled evaluation and comparison of the results of numerous dermatological studies, first of all, it is necessary to systematize the variability factors of FDP.

Another promising direction of its development is the establishment of inter-system regularities of human morphological variability [13,14]. Establishing the basic laws of group and intergroup variability of VAT, their comparison with genetic variability has already been made in previous years, at the phenotypic level, for example, with blood groups or other serological features. The fundamental direction of the development of dermatoglyphics is the solving of general problems of morphogenesis, in particular, the morphogenesis of the limbs, and the search for morphological markers that reflect its patterns. The type of skin pattern is an integral indicator of formative processes. Search for quantitative regularities and their distribution by individual fingers and their bi-lateral variability, quantitative regularities and spatial organization - this is, first of all, the search for regularities of phenotypic manifestation of cluster genes. He can provide at least new information than the direct allocation of the genes themselves and the study of the molecular mechanisms of their expression. The nature of signs of finger dermatoglyphics as morphogenetic markers within the constitutional integrity of an organism involves identifying their relationship with the physical abilities of a person, which develop in ontogenesis under significant influence of the external environment. Establishing the regularities of manifestation of inter-system relations will allow in the future further develop a system of criteria for predictive assessment of human abilities on the basis of phenotypology of finger dermatoglyphics [15,16].

Types of patterns are markers of general peculiarities of growth and local constitution. The presence of three main types of patterns and the percentage relationships between them correspond to the proportions of the three main types of variant anatomy (Shovkunenko V.N., 1925): 55-65% - perfect type (it corresponds to the loop type of pattern), 20-25% - transient (curls) and 10-15% -demanded (arches) [7]. The closure phenotype reflects rapid growth, arc - slowing [15]. It was also noted increase in the frequency of arched patterns in tall persons and lowering their frequency of curling patterns. In tall persons, the value of the index of the comb width is greater. For Bushmen,, which are usually tall, characteristic arches, and for low-growth Pygmies and Orcs - loops and curls. Men with Klinefelter syndrome (taller) also have an increased frequency of arc patterns, in comparison with healthy men, and in women with Shereshevsky-Turner syndrome (usually low-growth), the frequency of arched patterns is lowered and the frequency of loop and curl patterns is increased, and their comb width is significantly lower than that of healthy women [7]. Approximately 24-33% of variability in comb width is due to the intensity of the overall growth of the organism.

In forensic literature [6] determining the length of the body associated with metric dimensions of papillary traces. Thus, in men below 168 cm, the length of the index finger is less than 7.0 mm, in high men (higher than 176 cm) - more

than 7.5 mm. According to L.G. Edzhubova [17], a high growth corresponds to a comb score of at least 21, a small height of 2-3, and also there is a correlation between the angle of the loop and the height - in high individuals, the slope of the loop is closer to the norm, in the low - the loop "slips" horizontally.

Thus, the above suggests that the relationship of somatometric parameters (in particular, height) and dermatoglyphic parameters of individuals, living on the territory of Ukraine, will allow to identify certain dermatological phenotypes as genetic markers for diagnosing the growth of an unknown person.

The purpose of our study is to study the complex of signs of comb drawing of fingers and toes and their relationship with the growth of persons living on the territory of Ukraine, for further use of the obtained data in the practice of forensic examination in identifying an unknown person.

Material and methods. The research material was the anthropometric (height) and dermatoglyphic parameters of the fingers of 154 women of the age of 19-55 years living in the territory of the Ivano-Frankivsk region. The height was determined according to the standard method using a metal anthropometer. Finger print fingerprints are obtained by scanning the Futronic's FS80 USB 2.0 Fingerprint Scanner using the `frScanApiEx.exe` with the subsequent transfer of data to a personal computer. The processing of the data obtained was carried out according to the standard method [16], when macro-regimen studied the qualitative and quantitative indicators of dermatoglyphics of the fingers. The mathematical processing of the data was conducted through one-dimensional and multidimensional statistical analysis [8,18].

Results of the research and their discussion. At the first stage of work were studied anthropometric and dermatoglyphic features of the subjects. Complexes of key features allowed to form three groups depending on height [19]: persons with high \rightarrow 175 cm (I group), average - 164-174 cm (group II) and low - $<$ 164 cm - height (group III).

Among the qualitative indicators of finger dermatoglyphics of the hands and feet of importance, usually, give the frequency of patterns. Similar to the dermatoglyphics of the fingers, the main types of patterns were distinguished on the fingers of the foot [6]: arc (A), fibrillary loop (Lf) and tibial (Lt), curl (W) and complex patterns (LW). Due to the low frequency of complex patterns, when statically processing them were attached to the swirling. In addition, the large (first) finger can be determined by small details, so-called the "munitions". Their type has an alphanumeric meaning, and the number is written in numerical form [10].

The second stage of the work was the statistical processing of the material.

With a high degree of certainty ($p < 0,001$) it was found that in persons with high growth in the left and right hands and feet prevailing patterns of Lu type, statistically significant ($p < 0,01$) - type A patterns on the left arm and both legs, such as W - on both hands, LW - on the right leg (Table 1).

Table 1

Frequency of distribution (%) of patterns on the fingers and toes of persons of high growth

HAND	A	Lu	Lr	W	LW
left	12	58	3	21	6
right	2	62	8	26	2
LEG	A	Lf	Lt	W	LW
left	20	60	8	5	7
right	20	50	8	6	16

In people with average height it is established that on both hands and feet there are no patterns of type A.

Table 2

Frequency distribution (%) patterns on the fingers and toes in people of average height

HAND	A	Lu	Lr	W	LW
left	1	74	1	12	12
right	1	80	1	11	7
LEG	A	Lf	Lt	W	LW
left	10	50	20	10	10
right	1	88	0,5	10	0,5

Conclusions. Thus, the correlation between dermatoglifical and anthropometric parameters were sufficiently informative, which allowed them to be used in predicting external signs of a person. The use of stable relationships between anthropometric, anthroposcopic and dermatological parameters of a person will allow to extend a number of existing techniques included in the dermatoglyphic method of identification of an unknown person.

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ЗВ'ЯЗОК ПАЛЬЦЕВОЇ ДЕРМАТОГЛІФІКИ РУК І ЗРОСТУ ЛЮДИНИ

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Резюме. Ідентифікація невідомої особи залишається одним з актуальних напрямків судової медицини. Використання простих та матеріально необтяжливих методів дослідження дозволяє пришвидшити процес ототожнення загальних антропометричних та антропометричних параметрів людини. Дерматогліфічні параметри дистальних, середніх та проксимальних фаланг пальців рук є стійкими фенотипічними ознаками людини, які корелюють з іншими її параметрами. Отримані з використанням сучасних сканерів дерматогліфічні параметри є вже оцифрованими і підлягають швидкій обробці сучасними комп'ютерними програмами. Проведене дослідження дозволило встановити кореляційні взаємозв'язки між дерматогліфічними ознаками пальців рук та зростом у осіб жіночої статі гуцульської, лемківської та бойківської етно-територіальних груп. Кореляційні зв'язки між дерматогліфічними параметрами дистальних, середніх та проксимальних фаланг пальців рук та антропометричними параметрами виявилися достатньо інформативними, що дозволило використовувати їх при прогнозуванні зовнішньо-розпізнавальних ознак людини.

Ключові слова: дерматогліфіка, ідентифікація.