SOLES DERMATOGLYPHICS IN THE PROGNOSIS OF SPORTS ENDOWMENT: DIFFERENCES OF SOLES DERMATOGLYPHICS IN SPORTSMEN OF DIFFERENT SPORT KINDS

Serhiyenko L.P., Lyshevska V.M.
Mykolaiy inter regional institute of human's development
Kherson state agrarian university

Annotation. The problem of determining associations between certain groups of sports and dermatoglyphics feet. The study involved 207 men, the general population (those who are not in sports), aged 17-19 years and 78 men highly skilled athletes. It is shown that as a criterion in the sports orientation of children and adolescents can be dermatoglyphics. The features of the structure of the foot dermatoglyphics in men of different sports specialties. There are informative signs dermatoglyphics thumb and feet, which can be recommended to assess the prospects of a particular athlete's motor activity. Among these are the types of finger patterns, combined account and certain dermatoglyphic phenotypes. It is proved that certain features of dermatoglyphics feet act as genetic markers in predicting propensity athletes to realize the potential of high specific energy pattern.
Key words: sport, orientation, soles, dermatoglyphics, genetic, markers.

Introduction

Dermatoglyphics (Greek derma, dermat [os] – skin, glypho – to engrave) is a science about peculiarities of dermal ridges constructions on humans' and primates fingers and hands as well as on feet and toes. Dermatoglyphics researches can be perspective in different fields of knowledge [7]:

1. Clinical medicine. Peculiarities of dermal ridges can help to diagnose many hereditary diseases: severe chromosome aberrations (Down's disease, Shereshevskiy-Terner's syndrome), genomic abnormalities (femilketonuria, valvular defect and etc.), diseases with bent to hereditary character (epilepsy, schizophrenia, alcoholism, drug addiction, insular diabetes and so on).

2. Forensic medicine. Possibilities and prospects of dermatoglyphics' application in forensic medicine are connected with identification of a person, with affiliation and substitution of children.

3. Psycho physiology. There is a connection between dermatoglyphics and psychic features of a person. By dermatoglyphical markers it is possible to prognosticate a person's bent to high intellectual development. There is interconnection between dermatoglyphics and functional skewness of human hands.

4. Morphology. Dermatoglyphical markers make it possible to prognosticate development of morphological features even in early childhood.

5. Physical education and sports. Dermatoglyphical markers can help to determine child's bent to development of high level of strength, coordination, speed abilities and faculty for endurance and joints' flexibility. With sports selection by dermoglyphical markers it is possible to evaluate the prospect of a child for doing certain kind of sports. Considering high informational character of dermatoglyphics in genetic prognostication we the subject of this research to be an urgent one.

In scientific researches it has been proved that the representatives of different kinds of sports have their peculiar dermal ridges of fingers and hands [2, 7]. Even within certain kind of sports, dermatoglyphics of sportsmen of various specializations is different. So, sprinters, long-distance runners, jumpers and throwers [3, 4, 6], footballers forwards, halfbacks, fullbacks [1], boat racing sportsmen of different types [5] have differential distinctions in dermal ridges. However researches of differential distinctions of feet dermatoflyphics formations of sportsmen of different kinds of sports are unknown to us.

The work has been fulfilled as per the plan of scientific & research works of Kherson state agrarian university.

Purpose, tasks of the work, material and methods

The purpose of the research is determination of differential distinctions of phenotypic manifestation of foot dermatoglyphics of sportsmen of different specialties.

The tasks of the work were the following:

1. To determine the peculiarities of foot dermatoglyphics of different specialties' sportsmen.

2. To recommend certain foot dermatoglyphical signs as genetic markers for prognostication of sportsmen's bent to high level realization of potential possibilities of the determined energetic orientation.

The methods of the research. As per the methodology of T.D. Gladkova, we evaluated phenotypic manifestation of foot and toes' dermoglyphical signs. The technology of footprint obtaining and analysis of dermatoglyphical signs were described by us earlier (message 1).

Organization of the researches. The research embraced 207 person of general population (those who do not sports) of 17-19 years old age (the inhabitants of the south of Ukraine) and 78 sportsmen of high qualification. Among the sportsmen there were 4 Honoured Masters of Sports, 12 masters of sports of international category and 62 masters of sports. Dermatoglyphics of three groups of sportsmen was compared:

doi: 10.6084/m9.figshare.644738

1) group with dominating execution of competition speed-power oriented orientation (track and field sportsmen – sprinters, jumpers, throwers and weightlifters). They were 33 of them. In tables they were conventionally marked as SP;

2) group with dominating realization of anaerobic-aerobic abilities (general exercise's duration: from 20 seconds to 10 -12 minutes). This group consisted of sportsmen, specializing in boxing, free style wrestling, karate, weightlifting. 21 sportsmen took part in the researches. Designation: AnAE;

3) group with dominating manifestation of aerobic energy supply mechanisms in competition activity. This group consisted of boat racing sportsmen: kayak and canoe; long distance runners (1 500 m, 3, 5, 6, 20 km). The group included 24 persons. Designation: Ae.

Results of the research

Dermatoglyphics of big toe. Distribution of main types of left and right big toes as well as of both feet of general population persons and sportsmen of three groups dermal ridges are given in table 1: analyzing the obtained results we note availability of insignificant quantity of arc (A) and scroll (W) types ridges. The representatives of speed-power and aerobic kinds of sports practically have no arc ridges. The sportsmen of speed-power and anaerobic-aerobic kinds of sports have such ridges more often (12.2-16.7%) than the members of general population (9.3%). Concerning loop type ridges (L) the following trend can be noted: the representatives of anaerobic-aerobic kinds of sports have less quantity of loop ridges (71.4%) than the members of general population(81.6%). The sportsmen of aerobic kinds of sports have greater quantity of loop ridges (95.9%). The representatives of speed-power kinds of sports' indicators do not significantly differ form the population ones.

Table 1

Distribution of dermal ridges' main types of general population persons and sportsmen of three groups big toes

Groups of the tested	Dermatoglyphical ridges' types of big toe					
	A		L		W	
	Quantity	%	Quantity	%	Quantity	%
Right foot						
Sportsmen						
SP	0	0	29	87,8	4	12,2
AnAe	4	19,0	14	66,7	3	14,3
Ae	0	0	24	100	0	0
Left foot						
Sportsmen						
SP	1	3,0	28	84,8	4	12,2
AnAe	1	4,8	16	76,2	4	19,0
Ae	1	4,2	22	91,6	1	4,2
Total on two feet						
General population	38	9,1	341	81,6	39	9,3
Sportsmen						
SP	1	1,5	57	86,3	8	12,2
AnAe	5	11,9	30	71,4	7	16,7
Ae	1	2,05	46	95,9	1	2,05

Comparing dermatoglyphics of foot with dermatoglyphics of hand we can note for the sportsmen of some kinds of sports there is the same trend. So, boat racing sportsmen (with successes determined by aerobic workability) have mainly loop type ridges on hands. Track and field sprinters (speed-power kinds of sports) have more often scroll type ridges [7]. From this we can make the conclusion that loop and scroll ridges on big toe can be informative in sportsmen's orientation concerning doing certain kind of sports.

The quantitative indicators of different specialties sportsmen's dermatoglyphical deltas and ridges in comparison with the members of general population are given in table 2.

Table 2

Quantitative indicators $\left(\overline{X} \pm m\right)$ of dermatoglyphical deltas and ridges on big toes of general population's members and different specialties sportsmen

Groups of the tested	Right foot	Left foot	Two feet in total
Deltas			
General population	0,96 ± 0,03	0,98 ± 0,03	1,94 ± 0,04
Sportsmen			
SP	1,09 ± 0,06	1,06 ± 0,04	2,15 ± 0,09
AnAe	0,86 ± 0,07	1,05 ± 0,10	1,90 ± 0,14
Ae	1,00 ± 0,01	1,08 ± 0,08	2,08 ± 0,08
Ridges			
General population	13,00 ± 0,54	12,61 ± 0,523	25,60 ± 0,988
Sportsmen			
SP	14,00 ± 1,09	15,00 ± 1,36	29,00 ± 2,20
AnAe	13,29 ± 1,60	15,81 ± 2,28	29,10 ± 3,06
Ae	14,58 ± 1,22	15,42 ± 2,08	30,00 ± 2,80

The trend is as follows:

1) by the indicators of dermatoglyphical deltas no substantial distinctions between different specialties' sportsmen and population data are observed;

2) for sportsmen of different specialties greater quantity of dermatoglyphical ridges was determined in comparison with population data. Especially substantially it is noted for left foot. However, by ridges total data of big toes substantial distinctions between sportsmen of different specialties were not observed.

Dermatoglyphics of foot sole. The distinctions of dermal ridges on feet soles of general population members and sportsmen of different specialties were not substantial (see table 3).

Table 3

Quantitative indicators $\left(\overline{X} \pm m\right)$ of foot sole dermatoglyphics of general population members and sportsmen of different specialties

Groups of the tested	Right foot	Left foot	Two feet in total
General population	1,88 ± 0,64	1,72 ± 0,06	3,60 ± 0,11
Sportsmen			
	1,64 ± 0,78	1,48 ± 0,75	3,12 ± 1,43
SP	1,38 ± 0,59	1,57 ± 0,74	2,95 ± 1,28
AnAe	1,67 ± 0,96	1,75 ± 0,73	3,42 ± 1,58
Ae			

There are no substantial distinctions of dermatoglyphycal deltas between the sportsmen of different specializations and the members of general population (see table 4). Concerning dermal ridges on both feet, the indicators of speed-power kinds of sports differ a little (they are less) from indicators with anaerobic-aerobic and aerobic energy supply mechanisms and from the indicators of general population's members.

Table 4

Quantitative indicators $\left(\overline{X} \pm m\right)$ of foot sole dermal deltas and ridges of general population members and sportsmen of different specializations

Groups of the tested	Right foot	Left foot	Two feet in total
Deltas			
General population	2,11 ± 0,09	1,94 ± 0,09	4,05 ± 0,16
Sportsmen			
SP	1,79 ± 0,21	1,58 ± 0,14	3,36 ± 0,27
AnAe	1,62 ± 0,92	1,81 ± 0,12	3,43 ± 0,91
Ae	1,83 ± 0,43	1,96 ± 0,16	3,79 ± 0,41
Ridges			
General population	44,40 ± 0,94	40,61 ± 1,93	85,01 ± 3,57
Sportsmen			
SP	35,64 ± 1,43	33,97 ± 1,91	69,61 ± 3,63
AnAe	41,24 ± 1,24	41,71 ± 1,54	82,95 ± 2,51
Ae	40,50 ± 1,60	42,08 ± 1,06	82,58 ± 2,96

Distribution of dermatoglyphical phenotypes on both feet of general population members and sportsmen of different specializations are presented in table 5. If to compare the dermatoglyphics of different specializations' sportsmen, it should be noted that the most simple types belong to the sportsmen, having domination of aerobic energy supply mechanisms (LW=20,8%; WL=0%; L=25,0%).That means that the sportsmen of this group nearly have no phenotypes with scroll (W) type of ridges. But in comparison with other two groups and the members of population's members they have two times greater quantity of arc type (L) ridges. The representatives of speed-power and anaerobic-aerobic kinds of sports more often have phenotypes with "W" dermatoglyphical picture (phenotypes WL and LW) in comparison with the sportsmen of aerobic kinds of sports and persons, not doing sports.

Table 5

Distribution of feet soles' dermatoglyphical phenotypes, belonging to the members of general population (GP) and the sportsmen of different specializations.

Tested groups	Feet dermatoglyphical phenotypes															
	ALW		LW		WL		SLSW		L		W		LA		AL	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%
GP	0	0	165	39,5	13	3,1	47	11,2	47	11,2	37	8,9	58	13,9	51	12,2
Sportsmen																
SP	0	0	27	40,9	5	7,6	4	6,1	6	9,1	6	9,1	9	13,6	9	13,6
AnAe	0	0	13	31,0	8	19,0	4	9,5	3	7,1	4	9,5	7	16,7	3	7,1
Ae	0	0	10	20,8	0	0	6	12,5	12	25,0	3	6,3	9	18,8	8	16,7

The presented above gives the basis to affirm that dermatoglyphical signs of feet can be used in sport orientation of children and teenagers. As genetic markers, we may consider the following trend of feet dermatoglyphics' formation:

- Children with bent to kinds of sports with aerobic energy supply mechanisms, must have larger quantity of loop ridges (L) on big toes, than children and teenagers of general population and sportsmen, who are oriented to speed-power and anaerobic-aerobic kinds of sports. Children with bent to kinds of sports, requiring high levels of endurance, must have LW and L foot drmatoglyphical phenotypes;
- Children with bent to speed-power kinds of sports must have smaller ridges on both feet than the children, who have no bent to sports training and promising sportsmen of other specializations. They must have a little bit larger quantity of loop (L) and scroll (W) ridges on big toes in comparison with children of general population;
- Feet dermatoglyphics as a marker of children's bent to anaerobic-aerobic kinds of sports is less reliable for prognostication. For this purpose recommendations are the following. Children with bent to such work, as a rule, have less quantity of loop ridges (L) than children of general population and children with bent to speed-power and aerobic kinds of sports. By other foot dermatoglyphical quantitative indicators, children with bent to anaerobic-aerobic kinds of sports take intermediate place between typical dermatoglyphics of children with bent to speed-power kinds of sports and children with bent to aerobic kinds. So, the quantity of ridges can be the same as it is characteristic for promising children, having bent to aerobic kinds of sports, while foot phenotypes can be similar to children with bent to speed-power kinds of sports.

Summary

1. Dermatoglyphics of feet can be used as genetic markers for young sportsmen's orientation to training of different kinds of sports.

2. Prognostication of aerobic kinds of sports training for children with the help of feet dermatoglyphical signs is more reliable, while it is less reliable for prognostication of orientation to anaerobic-aerobic kinds of sports.

3. In our opinion dermatoglyphics of fingers and hands can be more reliable genetic marker than dermatoglyphics of big toes and feet.

4. Dermatoglyphics of feet shall be used in combination with other criteria, which can be recommended for genetic and pedagogical prognostication of children's bent to certain sports specialization.

The further prospects lie in research of efficiency of complex gifts to different kinds of sports.

References:

1 Abramova T.F., Nikitina T.M., Ozolin N.N. *Teoriia i praktika fizicheskoj kul'tury* [Theory and practice of physical culture], 1995, vol. 3, pp. 10-15.

2 Abramova T.F. *Pal'cevaia dermatoglifika i fizicheskie sposobnosti* [Finger dermatoglyphics and physical abilities], Dokt. Diss., Moscow, 2003, 291 p.

3 Koval'chuk G.I. *Teoriia i praktika fizicheskoj kul'tury* [Theory and practice of physical culture], 2003, vol. 9, pp. 31-34.

4 Koval'chuk G.I., Partuta A.M. Antropogeneticheskie i psikhologo-pedagogicheskie kriterii otbora tolkatelej iadra [Anthropogenetic and psycho-pedagogical criteria putter]. *Sovremennyj Olimpijskij sport i sport dlia vsekh* [Modern Olympic sport and Sport for all], Moscow, Physical Culture, 2008, vol. 2, pp. 64-65.
5 Ozolin N.N., Abramova T.F. Ispol'zovanie dermatoglifiki pri nachal'noj sportivnoj orientacii i individualizacii podgotovki [The use of dermatoglyphics in initial sports orientation and customize training]. *Grebnoj sport* [Rowing], Moscow, Physical Culture and Sport, 1986, pp. 38-41.
6 Pustozerov A.I., Melikhova T.M. *Diagnostika sportivnykh sposobnostej metodom dermatoglifiki* [Diagnosis of athletic ability by dermatoglyphics], Chelyabinsk, USAPC, 1996, 32 p.
7 Sergienko L.P. *Dermatoglifika, zdorov'e, sport* [Dermatoglyphics, health, sports], Ternopil, Educational book-Bogdan, 2012, 272 p.
8 Provins K.A. "Handedness" and skill. *Quarterly Journal of Experimental Psychology*, 1956, vol.2(8), pp. 79–95.
9 Hawkinson C.H. Dermatoglyphics at your fingertips. *Reviews in Anthropology*, 1979, vol.3(6), pp. 393–401.

Information about the authors:

Serhiyenko L.P.: ctrelcova@mail.ru; Open International University of Human Development "Ukraine"; Boiler Room str. 2, Nikolaev, 54003, Ukraine

Lyshevska V.M.: ctrelcova@mail.ru; Kherson State Agrarian University; Rosa Luxemburg str. 23, Kherson, 73006, Ukraine.

Cite this article as: Serhiyenko L.P., Lyshevska V.M. Soles dermatoglyphics in the prognosis of sports endowment: differences of soles dermatoglyphics in sportsmen of different sport kinds. *Pedagogics, psychology, medical-biological problems of physical training and sports,* 2013, vol.3, pp. 57-61. doi:10.6084/m9.figshare.644738

The electronic version of this article is the complete one and can be found online at: http://www.sportpedagogy.org.ua/html/arhive-e.html

Received: 12.01.2013
Published: 31.03.2013