Identification of dermatoglyphic profile of high level foreign fencers of the three armed force, participants of fencing world championship – Havana-Cuba/ 2003


Abstract: The aim of the present study was to identify the dermatoglyphic profile of high level foreign fencers, participants of the Fencing World Championship, staged in Havana, in Cuba, 2003. Six athletes of the three weapons participated in the study, seeing that four sabrer fencers, one epee fencer and one foil fencer. The fingerprints protocol used was Cummins & Midlo’s (1942). Values of digital patterns found for Arch (A) 0.2+0.41; Loop (L) 4.0+3.46; Whorl (W) 5.8+3.76; D10 15.7+4.08; TRC 155.8+32.44. Based on dermatoglyphic classification of Abramova et al. (1995), it can be concluded that the analyzed sample is fit between levels IV and V, with the trend to have maximized somatic-functional levels of coordination and endurance, and minimized the levels of force and stature.

Keywords - Fencing, high level, profile, dermatoglyphics, fingerprints

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INTRODUCTION

Fencing is, for the Greek, a science and art of individual combat with a white weapon, nowadays understood as a sports modality using a foil, sword or sabre. It is considered a science as some of its rules can be rigorously demonstrated by means of its essence and principles. Each movement has its importance and meaning, easily to be noticed by means of effects deriving from consequences, advantages obtained or generated annoyance. It is considered to be an art because its rules are meticulously studied in order to discipline the pragmatic application, for it is only by a meticulous study the way to achieve perfection, particularly for those psychologically and physically apt. It is about a Latin sports, whose name is derived from escrime, akin to the German form skiriman. The prerequisite for fencing is to hit or touch without being hit or touched, using ordinate movements (Scavasin, 2003).

As of the foundation of the Brazilian Fencing Confederation (Confederação Brasileira de Esgrima – CBE), in Portuguese, on June 5th, 1927, it was made official the fencing competitions in Brazil. In the first edition of the Brazilian championship, held in 1928, the combats were performed using three weapons, only men, in the freestyle category. However, despite almost eight years of official practice of it in Brazil, our country was able to make it international. In this manner, it is necessary that further studies on the quality and training standards for foreign athletes in order to promote it since the discovery of national talents.

This study present, as the main topic, the search of the modality recognition, for several reasons since functional to genetic.

In the Human Matricity Science, area aimed at motor performance training of high efficiency, observing the research line which approaches to, among other variables, the dermatoglyphics of motor performance, within an even greater project framed in the thematic axis of biophysical focus on motor performance.

OBJECTIVE

The study aimed to identify the dermatoglyphic profile of high efficiency foreign fencers for three weapons (epiee, foil, sabre), participants of the Fencing World Championship, staged in Havana, in Cuba, 2003.

Review of literature

Genetics as a new science had its major propellant Gregor Johann Mendel (1822-1884), monk and Austrian biologist. According to him, quoted by Fernades Filho (2003), "the inheritance of biological characters is subjected to certain laws, so that, if we know a couple’s genealogy, we will be able to provide which descendancy they are from". Bouchard, Malina & Perusse (1997:1) observe that the field of human genetics from a futuristic scenario. It is affirmed that a completed revolution is experienced by science and that this continuous process will certainly affect people’s lives and the coming generations. They also foresee that fitness sciences will be strongly influenced by such improvements, not only in human genetics, as well as in the molecular biology.

From the beginning, as a standard of genetic mark, there are fingerprints, which are referred to dermatoglyphs. Their formation is established between the third and sixth month of fetal life and remain stable with age. This fact causes the postnatal not to play any role in the dermatoglyptic variability, except for in some pathological conditions, bringing some advantages over other physical or physiological measures in human beings (Chakraborty, 1991). In the medicine, dermatoglyptic fingerprints have intrigued human beings since primeval times and a long the history, they have been the subject matter of anatomists, physiologists, geneticians, anthropologists and doctors among others. In addition, in the area of forensic identification, the dermatoglyphs have been
used as a method of worldwide acceptance for over a century (Penrose, 1968).

Fingerprints are informative and objective genetical marks which do not depend on ethnics and nationality. They can be used worldwide in the practice, selection and sports orientation of precocious talents. Fernandes Filho (1997) also adds that fingerprints allow a more adequate choice and specialization in sports, with an optimization perspective, as for the selection of individual talent. According to Abramova; Nikitina & Ozolin (1995), dermatoglyphics is a simple method for the determination of capacities and abilities of young athletes. Hence, it is necessary that coaches themselves have a good command of more simple methods for the diagnosis of genetic potential to start orientation, selection, discovery of talents, sports application, and specific training and development of endurance, velocity and strength quality or complex actions of coordination (Abramova; Nikitina & Ozolin, 1992).

Most authors distinguish three groups of dermatoglyphic patterns: arch, loop and whorl. The form of patterns constitutes a qualitative characteristic, while the quantity of lines (QL), the total of ridge count (TRC) . the quantity of skinfolds within a pattern represents a quantitative characteristic. The evaluation of intensity of patterns is made from the presence of deltas, calculating then the said delta index . D10; Arch (A) . pattern without delta; loop (L) . pattern with delta; Whorl (W) . pattern with two deltas, according to the corresponding evaluation . 0, 1 and 2. In word others, the maximum evaluation . 20 and a minimum . 0 (summation of deltas for the two hands), but arch is the most simple pattern and whorl the most complex (Gladkova, 1966).

In the 1970-1980, studies like Boris Alatoleev Nikitiuk’s together with his students appeared. They were dedicated to fingerprint problems, in the theory and practice of sports selection and individualization of preparation (Cavostiyarova & Colocko, 1990; Cafarova; Koltunova & Radgabova, 1988).

In it, it was shown that the pattern complexity may serve as hint for the prognosis of definite complexion (Nikitiuk, 1988); the increase of the quantity of lines is contrary to the development of velocity and strength (Guba, Tchernova, 1995); and static stability is correlated to the low quantities of lines, and slight complexity of patterns (Arutiohian, 1988). It was found the correlation of components of motor memory with pattern types: visual components .

Table 1 - Classification of the group of dermatoglyphic and somatic-functional indexes among high performance Russian athletes (OARS-MEN, n=101)

<table>
<thead>
<tr>
<th>Class</th>
<th>Fingerprints</th>
<th>Somatic – functional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D10</td>
<td>TRC</td>
</tr>
<tr>
<td>I</td>
<td>5.5</td>
<td>26.5</td>
</tr>
<tr>
<td>II</td>
<td>9.0</td>
<td>47.7</td>
</tr>
<tr>
<td>III</td>
<td>11.6</td>
<td>126.4</td>
</tr>
<tr>
<td>IV</td>
<td>13.1</td>
<td>134.2</td>
</tr>
<tr>
<td>V</td>
<td>17.5</td>
<td>162.8</td>
</tr>
</tbody>
</table>

Source: Abramova et al. (1995), adapted by the author of this article.

Abramova (1995, apud Fernandes Filho, 1997) affirms that, in the past two decades, in the Laboratory of Anthropology, Morphology and Sports Genetics of the Institute of Scientific Verification of Physical Culture for all RussiaNIIFK . Moscow, the studies have been carried out in two directions: fingerprints related to physical qualities and fingerprints related to the sports activity type, identifying the dermatoglyphic, somatotypical profiles and basic physical qualities of high performance athletes (Abramova; Ozolin & Martirosov, 1989).

Similar concern is reported in Brazil, with the clear purpose of bringing some scientificity to the sports selection. Dermatoglyphics has become one of the most important instruments in the complex sports science. Several studies concerning the most distinct sports practice have been carried out in order to identify trustworthy the sports profile of Brazilian sportspeople of high performance, for instance futsal, an indoor version of football (soccer). (Dantas & Fernandes Filho, 2002), volleyball (Medina & Fernandes Filho, 2002), artistic gymnastics (Joao & Fernandes Filho, 2002), Military Pentathlon (Silva; Zary; Pinheiro Da Cunha; Martins; Ferreira; Lincoln & Fernandes Filho, 2003), Triathlon (Anjos; Fernandes Filho & Novaes, 2003), Women’s volleyball (Zary; Pinheiro Da Cunha; Martins; Silva; Ferreira; Lincoln; Pinheiro & Fernandes Filho, 2003), Soccer field (Castanhede; Dantas & Fernandes Filho, 2003), orienteering (Ferreira & Fernandes Filho, 2003), among other which may be included in this never-ending search.
of variables which involve the formation and characterization of athletes.

The analysis and self-classification of fingerprints indexes, and more than eight somatic-functional indexes of high performance Russian athletes compose five major groups (cf. TABLE 1), which are distinguished by different functional dominant, so that the low intensity of patterns (D10) and low TRC are related to the high level of manifestations of strength and power, but with low level of coordination and endurance. On other hand, a high of the level of D10 and TRC, a large extent, is correlated to the reinforcement of dominant of endurance and coordination. The maximum values of D10 and TRC are oriented for the accentuation of coordinative qualities of the body (Nikitiuk & Gladysheva, 1989; Abramova, Nikitina & Ozolin, 1995): the low level of D10, increase of simple pattern portion (A, L), decrease complex pattern portion (W, WS pattern) and the increase of TRC . sports modalities with high power and short period of time for accomplishment; high level of D10, absence of A, increase by 90-50% of W portion and increase of TRC. sports modalities and differences in groups: velocity - endurance, games . fights. The modality of strength sports lies in the field of low values of D10 and TRC; modality with complex proprioception . in the field of high values; the groups of endurance sports are in the intermediate position. All modalities of game present the same tendency: the difficulties in terms of the game, the application of the field of game activity is correlated to the complication of fingerprint pattern, increase of D10 and the QL, increase of incidence percentage of patterns (W, WS pattern), with the shortening of percentage incidence of L and with the disappearance of A.

According to Aguila; Aljoe & Ferrer (2002:32), fencing presents as physical qualities to be developed in a training process, since childhood through adulthood, such as coordination, rapidity, strength, endurance and flexibility. Dantas (2003: 261) suggest the development and evaluation of flexibility, rapid strength, anaerobic endurance, aerobic endurance, velocity of movements, velocity of reaction, dynamic strength, agility, dynamic equilibrium and recovered equilibrium.

And thus, together with physical qualities, fingerprints are genetic marks which can serve as indicators of the main parameters of natural gifts and motor talents, differing not only the functional characteristics for each sports modality, but also the specialization in it.

**METHODOLOGY**

**Individuals**

Six male athletes freely and voluntarily took part in this study. There were four sabre fencer (two Spanish, one Italian and one Bulgarian), a foil fencer and one Argentian epiee fancer from the Fencing World Championship.

**Procedures**

At the beginning the individuals were introduced about the aims of the study, after being subjected to an anamnesis session, and signed a term of consentment.

Afterwards, some recommendations about the regular procedures were given during the data collection. In this occasion, they were oriented as for the procedures to be taken for the data collection of fingerprints.

**Protocol for the collection of fingerprints (Dermatoglyphics)**

The chosen protocol was that of dermatoglyphics, of Cummins & Midlo (1942), to which Fernandes Filho (1997) refers. The collection of fingerprints was carried out using the material as follows: paper (it is always preferable to use the paper of machine of mean

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**Table 2 - Particularities of dermatoglyphics in high performance and beginner brazilian athletes**

<table>
<thead>
<tr>
<th>Modality</th>
<th>Year</th>
<th>n</th>
<th>A (±SD)</th>
<th>L (±SD)</th>
<th>W (±SD)</th>
<th>D10 (±SD)</th>
<th>TRC (±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parachute soldier</td>
<td>2003</td>
<td>22</td>
<td>0</td>
<td>6.7±3.19</td>
<td>3.1±3.23</td>
<td>13.1±3.24</td>
<td>101±19.15</td>
</tr>
<tr>
<td>Men's swimming (inf/juv) velocists</td>
<td>2003</td>
<td>15</td>
<td>0.2±0.56</td>
<td>7.5±1.96</td>
<td>2.3±1.88</td>
<td>12.1±1.96</td>
<td>106.7±25.81</td>
</tr>
<tr>
<td>Women's swimming (inf/juv) velocists</td>
<td>2003</td>
<td>7</td>
<td>0.9±2.27</td>
<td>7.6±2.07</td>
<td>1.6±1.51</td>
<td>10.7±3.25</td>
<td>107.7±41.17</td>
</tr>
<tr>
<td>EsEFPEx military</td>
<td>2003</td>
<td>25</td>
<td>1.8±2.27</td>
<td>5.9±2.64</td>
<td>2.3±2.31</td>
<td>10.4±4.62</td>
<td>84.0±47.72</td>
</tr>
<tr>
<td>Aerobic trampoline male</td>
<td>2003</td>
<td>8</td>
<td>0.4±1.1</td>
<td>6.0±2.0</td>
<td>4.0±3.0</td>
<td>13.0±5.0</td>
<td>112.0±39.0</td>
</tr>
<tr>
<td>Karate</td>
<td>2003</td>
<td>14</td>
<td>0</td>
<td>4.6±1.87</td>
<td>5.4±2.35</td>
<td>15.4±4.08</td>
<td>159.7±24.08</td>
</tr>
<tr>
<td>Female artistic gymnastics</td>
<td>2002</td>
<td>25</td>
<td>0.6±1.05</td>
<td>6.3±2.18</td>
<td>3.1±1.45</td>
<td>12.4±3.08</td>
<td>97.8±25.74</td>
</tr>
<tr>
<td>Male Triathlon</td>
<td>2002</td>
<td>10</td>
<td>0.6±1.9</td>
<td>6.3±2.99</td>
<td>2.9±3.03</td>
<td>12.3±4.08</td>
<td>118.6±44.92</td>
</tr>
<tr>
<td>Chaser pilots</td>
<td>2002</td>
<td>34</td>
<td>0.3±0.0</td>
<td>6.4±2.45</td>
<td>3.4±2.55</td>
<td>13.1±2.90</td>
<td>129±32.10</td>
</tr>
<tr>
<td>Men's Volleyball</td>
<td>2000</td>
<td>22</td>
<td>0.7±0.29</td>
<td>6.5±2.94</td>
<td>3.4±2.97</td>
<td>13.4±3.11</td>
<td>125.0±39.12</td>
</tr>
<tr>
<td>Orienteering</td>
<td>2003</td>
<td>8</td>
<td>0</td>
<td>5.0±2.78</td>
<td>5.0±2.78</td>
<td>15.2±7.8</td>
<td>143.3±20.32</td>
</tr>
<tr>
<td>Men's Futsal</td>
<td>2000</td>
<td>66</td>
<td>0.0±0.17</td>
<td>6.5±2.89</td>
<td>3.5±2.90</td>
<td>13.5±2.93</td>
<td>147.4±32.88</td>
</tr>
<tr>
<td>Futsal children</td>
<td>2003</td>
<td>12</td>
<td>0.6±1.24</td>
<td>6.5±2.15</td>
<td>2.8±2.44</td>
<td>12.2±3.43</td>
<td>98.9±21.13</td>
</tr>
<tr>
<td>Soccer field</td>
<td>2003</td>
<td>48</td>
<td>0.58±1.3</td>
<td>6.9±2.7</td>
<td>2.56±2.7</td>
<td>12.0±3.2</td>
<td>99.17±35.5</td>
</tr>
<tr>
<td>Military Pentathlon</td>
<td>2003</td>
<td>6</td>
<td>1.3±1.8</td>
<td>7.6±1.5</td>
<td>0.7±0.5</td>
<td>9.2±2.2</td>
<td>82.3±42.0</td>
</tr>
<tr>
<td>Women's Handball</td>
<td>2003</td>
<td>18</td>
<td>2.6±1.51</td>
<td>6.5±1.93</td>
<td>1.0±1.43</td>
<td>8.0±2.37</td>
<td>90.0±36.31</td>
</tr>
<tr>
<td>Beginner's Handball</td>
<td>2003</td>
<td>32</td>
<td>0.2±0.74</td>
<td>7.0±2.67</td>
<td>2.8±2.77</td>
<td>12.6±3.05</td>
<td>94.6±25.08</td>
</tr>
</tbody>
</table>

Source: Fernandes Filho (2003), adapted by the author of this article.
density and rugosity), and IMPRESS stamp pad of fingerprints and a piece of anchor of plate 25x10 cm.

The phalanxes should be covered with ink beside the gap surface and the sides until the fingernails. For its print, the phalanxes should be pressed carefully without moving them, turning the finger from one corner to the other side of the fingernails, for the side of the indicator finger.

After the collection, there was a preliminary processing of reading, whose standard method is the following:

1) The commonest patterns of distal phalanxes of the finger (cf. FIGURE 1):

. Arch “A”. pattern without deltas. is characterized by the absence of triradia or deltas, and is composed of crests which cross transversally the digital pad digital (cf. FIGURE 1-a);

. Loop “L”. pattern of one delta. possesses one delta. It is a half-closed pattern in which the skin crests start from one end of the finger, are curved distally in relation to another one, but without approaching that, where they begin from. Loop is an open pattern. If the loop is open to the radial side, it begins to be called “R” from radial. If the loop is open to the ulnar side, it is called “U” from ulnar (cf. FIGURE 1-b);

. Whorl “W”. patterns of two deltas. possesses two deltas. It is a closed figure, in which the central lines are concentrated around nucleus of the pattern (cf. FIGURE 1-c).

2) QL . quantity of lines of skin crest in a pattern . is counted according to the line which links to the delta and the center of the pattern, without taking into consideration the first and last line of crest.

At this moment, the fundamental standardized indexes of fingerprints are calculated:

- the quantity of patterns of different types for all fingers;
- the QL in each finger;
- the small intensity of patterns or the delta index (D10). This is obtained following the summation of deltas of all patterns, so that the “evaluation” of Arch (A) is always equal to 0, and the absence of delta of each Loop (L) is equal to 1 (one delta); of each Whorl (W) is equal to 2 (two deltas), i.e., \( \Sigma L + 2 \Sigma W \);
- TRC in all fingers;
- the types of digital formulae which should be indicated in the representation in the individuals, the different types of patterns. Maybe several types are identified, for example:
  AL . the presence of arch and loop for any combination.
  ALW . the presence of arch, loop and whorl for any combination.
  10 A, L or W . ten arches, loops or whorls.
  L > W . loop and whorl, number of loops must be greater than 5 (five).
  W > L . whorl and loop, number of whorls must be greater than 5 (five).
  L = W . loop and whorl, number of loops must be equal to 5 (five).

**ANALYSIS AND DISCUSSION OF RESULTS**

Fingerprint patterns and their types of combinations, D10, QL, as well as TRC were analyzed. The TABLES 3 and 4 show the mean results, minimums, maximums and deviations of fingerprint patterns, D10, QL and TRC.

The mean dermatoglyphic characteristics of athletes, about the fingerprint patterns, indicate the W predominance W (5.8 + 3.76) and L (4 + 3.46), more complex patterns which present high correlation to the component of motor memory: proper
The study sought, by means of qualitative and quantitative indexes which represent fingerprints, to characterize the informative, objective marks and orientation for sports selection. The fencers presented a tendency for annulment the fingerprint pattern A, with L in an intermediate quantitative position and W predominance W.

In the light of dermatoglyphic classification of Abramova, Nikitina & Ozolin (1995), the sample is fit between the levels IV and V, presenting high index of D10 and TRC. And thus, it might have maximized the somatic-functional levels of endurance and coordination, and minimized the ones of stature and strength (relative and absolute). Based upon such information and employing dermatoglyphics as an important tool, the base training for young fencers can and should be made in order to meet the development of physical qualities proposed in the sports. This is based on probable deficiencies and evidenced virtues by fingerprints.

REFERENCES


CONCLUSION

proprioceptivo-motor and visual component. And thus, it is also noticed a significant shortening of the A pattern, indicating that, high sports performance and in terms of physical qualities in sports, the presence of it is insignificant.

The characteristic variables of the fingerprints of the analyzed fencers about the D10, whose mean value was equal to 15.7, and TRC of 155.8, it suggests high levels somatic-functional of endurance and coordination.

In this manner, based upon the total profile of fencers, it could be observed that they presented considerably superior value in relation to D10 and TRC, when compared with other athletes studied, as futsal players (Dantas & Fernandes Filho, 2002), male volleyball players de (Medina & Fernandes Filho, 2002), Olympic ginasts (Joao & Fernandes FILHO, 2002), militar penathletes (Silva, Zary, Pinheiro Da Cunha, Martins, Ferreira, Lincoln & Fernandes Filho, 2003), triathletes (Anjos, Fernandes Filho & Novaes, 2003), female volleyball players (Zary, Pinheiro Da Cunha, Martins, Silva, Ferreira, Lincoln, Pinheiro & Fernandes Filho, 2003), players de Soccer field (Castanhe De, Dantas, & Fernandes Filho, 2003), Orienteering athletes (Ferreira & Fernandes Filho, 2003), and similar values for karate players (Fernandes Filho, 2003).

Dermatoglyphics has become one of the most important instruments in the complex sports science, be it in training, related to basic physical qualities or, in the selection of talents. Then it has arisen the possibility of adding dermatoglyphics as another protocol, for it possibly suggests the individuals f predisposition to a sport or similar. This is related to the results of a non late evaluation which is revealed according to the profile of high performance athletes.

Graph 1 – Dermatoglyphic profile, QL, D10 AND TRC of fencers