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Dermatoglyphic Profile and Hand Grip Strength of the Finalists Athletes in the Brazilian Paracanoe Championship

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ABSTRACT

Sousa APS, Ferreira HR, Fernandes Filho J. Dermatoglyphic Profile and Hand Grip Strength of the Finalists Athletes in the Brazilian Paracanoe Championship. **JEPonline** 2016;19(1):50-56. The aim of this study was to analyze the dermatoglyphic profile and hand grip strength of the finalists in the 2012 Brazilian Paracanoe Championship. The subjects consisted of 19 paracanoe athletes divided into 5 groups according to their functional class and vessel. Cummins and Midlo protocols were used for dermatoglyphic indices (A, L, W, D10, and SQTL) and Marins and Giannichi for grip strength of right hand (DRH) and left hand (DLH). Descriptive statistics and the One Way ANOVA and *post hoc* test of Tukey HSD were used to compare the groups. The significance level for all tests was 5%. The dermatoglyphics showed a predominance of drawing "L" in all groups with the highest average D10 (14.5 ± 2.3) in the KTA group and the higher average SQTL (159.0 ± 49.8) in the KLTA group. In the grip strength, the VLTA group showed a significant difference between the DRH and the DLH (means of 44.0 ± 9.5 and 49.3 ± 6.0, respectively). These groups showed very interesting characteristics to the practice of paracanoe and, therefore, allows for application of data directly in the training of a more specific and individualized approach to improving.

Key Words: Paracanoe, Dermatoglyphic, Grip strength

INTRODUCTION

The Paralympic Games began in Stoke Mandeville in 1948. It featured 16 athletes who were injured servicemen and women. That year, the neurologist, Sir Guttmann gave a great historic step to promote the Olympics for people with spinal injuries. In 1960, the Games in Rome, Italy were considered by the International Paralympic Committee as the first Paralympic event, called the Olympics of the Disabled carriers, which brought together 400 athletes from 23 countries. All athletes were in wheelchairs (2).

The Olympic and Paralympic Games are characterized as the largest multi-sport competition event around the world. In 2016 the eyes of the world will be on Rio de Janeiro for the Paralympic Games of the XXXI Olympiad. There will be more than 4,350 athletes from 178 countries. The athletes are expected to compete in 428 medal events across 22 sports, including paracanoe (13).

Aside from the development of autonomy during the canoeing activity (3), the work done in the canoe with disabled carriers helps to change attitudes towards people with a disability. In particular, paracanoe athletes regained a sense of ability they thought they had lost from their participation in sports. They have also elevated the status of Brazil in athletics by claiming two gold medals on day one of the ICF Canoe Sprint World Championship in Milan after four nations shared the early titles in the paracanoeing event.

Although Brazil has a great opportunity to earn medals in Paracanoe at the next games, it is important to get information about these athletes to enhance their coaching. In agreement, Fernandes and Fernandes Filho (8) and Grosso et al. (12) state that it is essential to know the characteristics of different sports to create a database from which the information can be used to enhance the specificity of different sports and the respective athletes' skills and performance.

In Greek, "derma" equals skin and "glyphos" equals engrave, thus dermatoglyphics is the scientific study of fringerprints. According to Dantas et al. (4), it is an important tool for genetic characteristics, since it is a genetic marker that allows for association with the basic physical qualities. Thus, the purpose of this study was to analyze the dermatoglyphic profile (i.e., the genetic potential of a subject through his or her fingerprints) and the hand grip strength of the finalists of the 2012 Brazilian Paracanoe Championship.

METHODS

Subjects

The study consisted of 19 athletes (mean age of 34.7 ± 7.7 yrs) who were finalists in the 2012 Brazilian Paracanoe Championship. They were divided into 5 groups according to their: (a) Vessel: kayak (K) and Hawaiian canoe (V); and (b) Functional class: LTA (uses legs, trunk, and arms), TA (uses only trunks and arms), and A (uses only arm).

The inclusion criteria required the athlete: (a) to be linked to Brazilian Canoe Confederation; (b) to have at least 3 yrs of training in the sport; and (c) to have an adequate physical condition for the tests, which was previously assessed by the team. Participation of the athletes in the study was voluntary. All subjects were informed of the research procedures

prior to the data collection period, and each gave his free and informed consent to participate. All procedures were previously approved by the ethics committee of the University Hospital Lauro Wanderley- CEP / HULW.

Procedures

The collection of the subjects' fingerprints was carried out using a Verifier 320 LC scanner from Cross Match® in accordance with the dermatoglyphia protocol described by Cummins and Midlo (5). The distal phalanges of the fingers were pressed on the digital player using a rotational motion. Then, the following dermatoglyphic drawings [Arch (A), Loop (L), and Whorl (W)] and dermatoglyphic indices [delta index (D10) and the sum quantity total of lines of the 10 fingers (SQTL)] were identified.

The analysis of dermatoglyphic characteristics was performed by three experts trained in the Bioscience Laboratory of Human Movement (LABIMH-UFRJ). For the test of dynamometry, the size of the footprint was adjusted in such a way that the middle phalanx of the middle finger is a right angle with the forearm positioned at any angle between 90° and 180° relative to the arm, which must be in a vertical position. The evaluator exerted maximum force. Each subject tested maximum force twice, not consecutively, with each hand, right hand (DRH) and left hand (DLH) (11).

Statistical Analyses

Descriptive statistics (means and standard deviations) were used to evaluate the results. Statistical comparison of the groups was carried out using the One-way Analysis of Variance (ANOVA) test and the Tukey HSD (Honestly Significant Difference) test. The significance level was set an alpha level of 5%.

RESULTS

The descriptive results (average and standard deviation) of dermatoglyphic indexes (A , L ,W, D10, and SQTL) are shown in Table 1. Table 2 presents the frequencies of the dermatoglyphic drawings, arch "A", loop "L", and whorl "W" per group. Descriptive and comparative dynamometer results of the right hand and left hand are presented in Table 3.

Table 1. Descriptive Results of Dermatoglyphic Indexes.

Groups	A	L	W	D10	SQTL
KA	0.5 ± 1.0	7.5 ± 2.4	2.0 ± 2.7	11.5 ± 3.3	123.0 ± 60.3
KTA	1.0 ± 0.6	7.0 ± 2.1	3.0 ± 2.1	14.5 ± 2.3	127.0 ± 63.2
KLTA	0.2 ± 0.5	6.8 ± 3.2	3.0 ± 3.5	12.8 ± 3.8	159.0 ± 49.8
VTA	0.5 ± 0.6	8.0 ± 0.8	1.5 ± 1.2	11.0 ± 1.8	127.8 ± 26.9
VLTA	0.3 ± 0.6	7.0 ± 2.6	2.7 ± 2.3	12.3 ± 2.1	149.5 ± 34.9

A = arch; **L** = loop; **W** = Whorl; **D10** = delta sum of the 10 fingers; **SQTL** = sum quantity total of lines; **KA** = kayak using only arms; **KTA** = kayak, using arms and trunk; **KLTA** = kayak, using arms, trunk and legs; **VTA** = Hawaiian canoe, using arms and trunk; **VLTA** = Hawaiian canoe using arms, trunk and legs

Table 2. Results of Dermatoglyphic Frequency Indices.

Groups	A		L		W	
	n	(%)	n	(%)	n	(%)
KA	2	5.0	30	75.0	8	20.0
KTA	1	2.5	27	67.5	12	30.0
KLTA	2	5.0	18	45.0	20	50.0
VTA	1	3.3	21	70.0	8	26.7
VLTA	2	5.0	32	80.0	6	15.0

A = arch; **L** = loop; **W** = whorl; **D10** = delta sum of the 10 fingers; **SQTL** = sum quantity total of lines; **n** = population; **%** = frequency; **KA** = kayak using only arms; **KTA** = kayak, using arms and trunk; **KLTA** = kayak, using arms, trunk and legs; **VTA** = Hawaiian canoe, using arms and trunk; **VLTA** = Hawaiian canoe using arms, trunk and legs

Table 3. Descriptive and Comparative Dynamometry Results.

Groups	DRH (kgf)	DLH (kgf)	P
KA	34.8 ± 21.8	40.1 ± 17.6	0.18
KTA	30.8 ± 18.7	36.6 ± 17.8	0.45
KLTA	42.5 ± 17.7	42.3 ± 14.9	0.63
VTA	35.5 ± 7.1	35.8 ± 8.3	0.42
VLTA	44.0 ± 9.5	49.3 ± 6.0	0.05

DRH = dynamometry Right Hand; **DLH** = dynamometry Left Hand; **KA** = kayak using only arms; **KTA** = kayak, using arms and trunk; **KLTA** = kayak, using arms, trunk and legs; **VTA** = Hawaiian canoe, using arms and trunk; **VLTA** = Hawaiian canoe using arms, trunk and legs

DISCUSSION

The dermatoglyphic indexes of the athletes were classified according to Abramova et al. (1). The analysis of the data indicated that the intermediate values of STQL and D10 were observed in all groups, which highlights a genetic predisposition to speed, explosive strength, and coordination. All of these factors are important characteristics of canoeing athletes.

Santos and colleagues (14) analyzed sprinters who require power and speed to perform well. They found 64.7% frequency for the dermatoglyphic drawing loop (L). Also, in a study with the Brazilian national slalom canoeing, Ferreira and Fernandes (10) found a predominance of the dermatoglyphic drawing L in all groups (with an average of 6.0 to 8.6). Their findings are in agreement with the results found in paracanoeing speed with a lower average in the KLTA group (6.8 or 45%) and a higher average in the VTA group (8.0 or 70%).

The LTA groups of both vessels showed higher strength in the dynamometer test and SQTL, which requires a predominance of coordination (as expected due to the need to coordinate the arms, legs, and trunk to complete the rowing movement). Fernandes Filho (6) reported the increase in W and the increase of STQL characterized sports strength and coordination,

thus emphasizing the importance of the identification in a high quality level so the athletes' development could be improved.

The results of dynamometer tests showed lower values than the Brazilian national canoeing reported in the study by Ferreira and Fernandes Filho (9), an average between 55.28 kgf and 36.83 kgf, as expected of the disabled athletes. The highest values were presented by both groups of LTA vessels (KLTA = 42.5 / 42.3 kgf; VLTA = 44.0 / 49.3 kgf, i.e., groups of athletes with less disabilities), which was expected.

By analyzing the correlation dynamometry in both hands, we observed a significant difference in VLTA group, athletes who compete in Hawaiian canoes using an oar with only one shovel. This difference can be explained by the dominance of the athlete, right or left handed. In the other groups, no significant differences were found

CONCLUSIONS

Although paracanoeing is a recent modality, it is a great sport option for disabled people. Inside the kayak allows for performance possibilities and physical conditions for mobility that are essentially equal to non-disabled athletes. Thus, it is reasonable to conclude that the physical limitations are minimized.

It is also important to point that the relative ease of accessing the sport by disabled athletes allows for an increase in opportunity to participate and, therefore, a decrease in the prejudice of society towards the disabled. Brazil is one of the leading countries regarding the disabled and sporting opportunities. It is also a country of accommodating rivers that helps to make the sport of paracanoeing a viable opportunity.

Based on the findings in the present study, the genetic information obtained from the dermatoglifia demonstrates that the groups had very interesting characteristics and potential as paracanoeing athletes. Hence, the use of dermatoglifia is an important assessment tool in combination with standard physical tests that should help increase the chance of success in sports.

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