

RELATION BETWEEN PERFORMANCE AND ANTROPOMETRIC AND FUNCTIONAL PROFILES OF OPTIMIST SAILORS

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This study investigates the relation between anthropometric and functional characteristics of juvenile/infantile categories and their results at the State Optimist Class Sailing Championship of 2006 held in Rio de Janeiro. A group of 50 male sailors of both categories were evaluated. The juvenile category presented superior height, as expected, and a lower fat percentage in relation to the infantile category, maintaining the body mass index (BMI) and body mass similar. The number of training sessions, the manual strength and weight presented significant correlation with the performance.

KEY WORDS: Anthropometrics, Optimist, Young Sailors, Juvenile/Infantile athletes

INTRODUCTION:

Yachting is a nautical sport, practiced on sail boats, moved exclusively by the wind and competed in events called regattas. This sport uses many different kinds of embarkations, separated in appropriate categories, known by classes. The Optimist class is the first level of learning to sail and uses an embarkation crewed by just one sailor, with a 15-year-old age limit. Yachting is becoming popular in Brasil, due to competition results achieved at international level.

Even so, it is still rare to find research in the literature regarding the conditioning of athletes, especially for this base category.

The anthropometric profile is a well known parameter to characterize differences among physical training groups [5] and juvenile/infantile athletes in different modalities has been characterized, just to detect talent and follow the training. [7,8]. A proper profile configuration of a group, which aims at intervention, could be the difference between success and failure in terms of strategy for a sports training program [4]. Technical trainers, physical trainers and researchers are directing their efforts to the task of adjusting the athlete's profile for each modality, with the objective of achieving the maximum performance, because some research points to the correlation between the physical characteristics and athletic performance [6].

Another way of characterizing a one modality athlete is by functional evaluation of physical capacity, like those related to strength and muscle power. Strength tests of manual pressure and vertical jumps are common examples of this kind of evaluation [2,11], however, fewer studies are applied to children and young people.

The objective of this study was to trace the anthropometric and functional profiles of male children and adolescent sailors of the Optimist class and correlate these to the final results at the championship.

METHOD:

Data Collection: The sample was composed of 50 male sailors, with 17 in the infantile category (11-12 years) and 33 in the juvenile category (13-14 years), all participants of the State Optimist Class Sailing Championship, held in Rio de Janeiro, Brazil, in November of 2006.

The data was collected before the competition, with 3 minutes duration for each athlete. Initially, a questionnaire was applied, containing information regarding to practical experience: years of practicing (YP) and number of training sessions per week (SW).

Then, the anthropometric measurements were taken: BM – Body Mass (kg), H – Height (m), and CF – Cutaneous Fold (mm), using a CERCORF Ltda.compass, with 0,1 mm of resolution in sub-scapular (SS) and tricipital (TR) regions of the right side of the body. The

following parameters were calculated: body mass index – BMI (kg/m²), by the quotient of body mass to the square of height; and fat percentage (%Fat) obtained by the Boileau equation for boys [9]:

$$\%Fat = 1,35 (TR+SS) - 0,012 (TR+SS)^2 - 4,4$$

For the functional evaluation, two tests were applied: the vertical jump test and hand grip test. For the vertical jump, a jump platform, JUMP SYSTEM 1.0 (Cefise LTDA.), was used. The athlete was positioned, barefoot, in the interior of platform, with hands fixed at the waist. The test consisted of realizing a maximal vertical jump, with a free countermovement. Two jumps were realized with a 1 minute interval. It was considered the highest jump in centimeters.

For the manual strength it was applied the hand grip test with a resistant dynamometer of manual pressure JAMAR, Dammons Preston Inc, with an adjustable grip. The boys realized the maximal grip strength, with the dominant arm, keeping it alongside the body, with the forearm pronated. After one adaptation trial, the participant was asked to press the instrument strongly and immediately set it free. The result was in kgf unit.

For the statistical analysis of the values obtained in the two categories, the Student “t” test was applied for independent samples. The Spearman Rank Correlation was applied among all variables and the race results in the championship, considering both the whole group of sailors and the 10 first places. The STATISTICA 5.1 applicative (Stat Soft, Inc.) was used with significant index (α) of 0,05 (5%).

RESULTS:

The variables analyzed in this study are showed at Table 1 (average and standard deviation). Table 2 presents the statistically significant correlations between variables and the race result.

Table 1 Average (standard deviation) of the variables for the juvenile (J) and infantile (I) categories.

	J (N=33)	I (N=17)
BM (Kg)	48,9 (± 7,5)	45,6 (± 5,5)
H (cm)	161,7 (± 7,7)	152,8 (± 5,8)*
BMI	18,7 (± 2,2)	19,6 (±2,8)
%Fat	18,6 (± 5,5)	23,9 (± 7,0)*
Strength(Kgf)	29,6 (± 5,5)	22,5 (± 2,9)*
Jump (cm)	31,6 (± 4,7)	25,5 (± 4,7)*
SW (days)	3,06 (± 1,32)	3,06 (± 0,66)
YP (years)	4,15(± 1,29)	3,58(± 1,12)

*p<0,05

Table 2 Correlation coefficients between race result and the variables listed in table 1. Only statistically significant coefficients are showed, for the whole group and the first 10 places.

	Race result (total)	10 first places
TSW	-0,34*	-0.73*
Strength	0,01	-0.67*
BM	0,08	-0.83*
YP	-0,35*	-0,31

*p<0,05

DISCUSSION:

Based on anthropometric characteristics, the juvenile category presented significant superior height, as expected, but a lower fat percentage in relation to the infantile category. In spite of being taller, the lowest %Fat resulted in similar weight and, consequently, BMI. These results suggest that a longelineous profile is an important characteristic for keeping sailing in this class with good performance. It's common to observe a migration of the under 15-year-old sailors from the Optimist class to other classes, such as Laser, when, they reach a physical constitution more mesomorphic, becoming disadvantageous to the performance in low or medium wind intensities. A greater height also makes maneuvers such as tacking and jibes difficult, and stresses the knee joint, which remains, most of time, in a flexed position. In this sport, it is common to have a sailor who presents a better performance in a specific wind intensity, which is more adapted to their physical biotype. The ideal would be to reach a compromise between height and weight, leading to the possibility of good performances in different wind conditions.

We could not identify, in the literature, similar reports about studied parameters of the sailors in this class. Sailing biomechanical studies are reported in adults, related to olimpic or pan-american classes [10]. Unfortunately, there's a lack of knowledge about the development of children who are engaged in this sport practice and competition. According to Böhme [1], high performance sport can only be reached when its basis is developed since childhood.

Comparative analyses can be made only with other sports modalities that are more studied, such as swimming, gymnastics and volleyball players. One example is the study of Prestes et al. [8], that demonstrated, in swimmers athletes of infantile and juvenile categories, body mass values (I = 53,1 kg, J = 66,1 kg), height (I = 1,61 m, J = 1,74 m) and BMI (I = 20,36 kg/m², J = 21,91 kg/m²), superior in relation to the athletes of the same categories in the present study. The infantile category presented the higher %Fat, in both studies, when compared to the junior category. These results clearly show the biotypes adapted to the modality practiced. The swimmer athlete presents higher values of BMI, because the increase of body mass is directly related to a higher strength production when swimming. It's also easy to observe the anthropometric standard of swimmers that presented increased musculature, mainly in terms of thorax and superior members, contrasting with the longelineous type of Optimist sailor.

The study realized by Farias et al [3], in non-athlete students with ages between 11 and 14 years, showed that the infantiles presented body mass (44,2 kg) and height (1,49 m) values below that found in our study, while the ones of the juveniles presented body mass (54,1 kg) and height (1,63 m) superior to those in our study.

The functional characteristics were also different between juvenile and infantile sailors. The hand grip strength and the vertical impulse were higher in the juvenile group, which was expected, based upon the higher development stage. There was no difference in BMI between categories, which suggests that they are more efficient in strength and power production, which is very convenient for this sport modality. Esteves, A. C. et al [2] evaluated the hand grip strength of both sexes of children, non athletes, aged between 11 and 14 years old. They verified for the male, a progressive and slow increase, with higher intervals at 11 and 12-year age groups, becoming abrupt at the puberty phase of 13 and 14 year-olds, which was also verified in this study. However, the average values found in this study for hand grip strength, were higher in both categories when compared to those obtained in non athlete children with a similar age.

The statistical correlation between variables and results of the whole group at the competition, showed that the experience of the sailors (years of practicing and training sessions per week) is determinant for performance and no relation with anthropometric or functional characteristics were found. When considering the first 10 places, an anthropometric (body weight) and a functional (manual strength) became related to the ranking places aside the expertise (sessions per week). This demonstrates that monitoring those variables of young sailors could be a good follow up of the training program.

The adequate characteristics for any sport practice are modulated by heredity, by the physical training specificity, by the nutrition aspects, among other factors, including psychological and social ones that can contribute to success overall in high performance

sport. Regarding the subject concerning children and adolescents, it is essential that the investigation and acknowledgments focus on the sport practice impacts, not only on high performance, but primarily on health to ensure the complete development of the young athletes.

CONCLUSION:

The present study showed anthropometric and functional characteristics of sailor athletes of the Optimist class, participants in the State Sailing Championship of Rio de Janeiro, Brazil. The results demonstrated that juvenile category sailors presented longelineous characteristics, being taller and stronger, but with similar percentual fat and body mass compared to the infantile athletes. This can be a good relation between anthropometric and functional characteristics to enhance performance in this kind of embarkation.

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