thermal stress due to change in the homeostasis resulting heat stress(Keim, Guisto, & Sullivan Jr, 2002). Nineteen adult males (22.58±1.05 age) did two maximum incremental stress tests in cycloergometer separated by 48 hours in normothermia (22±2ºC) and in hyperthermia (42±2ºC), respectively. Blood and urine samples were taken before and after each test. Serum, urine and erythrocyte analysis of trace metals was performed by inductively coupled plasma mass spectrometry (ICP-MS). Serum and erythrocyte concentrations were corrected by the formula of Dill and Costill (Dill & Costill, 1974). No significant differences were found between before and after the test in normothermia or hyperthermia.

		Normothermic (22ºC)			Hyperthermic (42ºC)		
		Before	After	Sig.	Before	After	Sig.
Se	Urine	19.34±7.78	18.09±6.74	0.586	18.44±9.77	20.39±13.87	0.215
	Serum	119.13±14.24	123.58±21.74	0.747	117.57±3.29	119.06±22.42	0.679
	Erythrocite	56.94±19.52	55.67±23.84	0.836	56.61±24.54	57.77±27.77	0.586
Zn	Urine	448.65±206.73	432.10±200.92	0.981	333.15±242.48	391.48±300.04	0.094
	Serum	857.67±145.60	803.72±220.49	0.398	856.09±176.58	853.14±266.47	0.777
	Erythrocite	5.30±1.21	5.14±1.42	0.679	5.22±1.35	4.89±1.49	0.650

1. The concentrations, urinary, serum and erythrocyte remain unchanged as a result or test or hyperthermia.
2. Hyperthermia used did not make a cardiovascular displacement.
3. Hyperthermia used did not produce a decrease in performance test.

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Swimming performance and dry-land upper limbs strength in age group swimmers

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High values of dry-land strength and power, particularly in the upper-body, have been identified as a determinant factor to success in competitive swimming. Ball throwing is a common test used to assess dry-land strength and power in age group swimmers. Therefore, the aim of this study was to determine the correlation between ball throwing measures and swimming performance. Twenty-one male prepubescent swimmers (12.7 ± 0.7 years; 47.7 ± 9.6 Kg; 1.56 ± 0.78 m) were recruited for this research. Experiments were conducted during the competitive period of the spring training, thus ensuring that the subjects were in a prime training period cycle. After a standard warm-up of articular mobilization and rope skipping of approximately 10 minutes, Ball throwing (BT) distances (in m) were measured through maximal throwing velocity tests using a 1 and 3 kg medicine ball. Preceding the tests, each participant executed several random throws for warm-up, with both balls. Each participant executed three throws with 2 minutes rest between attempts. Three technical valid attempts were used to calculate the average for analysis. Swimming performance tests were executed after an 800 m moderate intensity warm-up in a 25 m indoor swimming pool. All subjects completed one maximal test of 50 m and 15 m (to exclude the influence of start) in front crawl in order to access their best time in each test (t50 and t15). Short distances were chosen due to the influence of force application over these distances. Spearman correlation coefficients were calculated between in water and dry land parameters assessed. Significance was accepted at the $p<0.05$ level. Correlations obtained between ball throwing values and swimming performance were moderate to strong for both 1 and 3 Kg balls throws (table 1). Mean values (± sd) obtained for ball throwing were: 4.19 ± 0.71 m (1 kg) and 2.84 ± 0.47 m (3 kg). Swimming performance mean values (± sd) were 10.63 ± 0.51 s for 15 m trial and 33.70 ± 2.46 s for 50 m trial. Results showed moderate to strong associations between variables, which may indicate that ball throwing can be a valid procedure to evaluate

Table 1
Correlation values (ρ) between ball throwing values (1 and 3 kg) and swimming performance (15 and 50 m).

	BT_1kg	BT_3KG
t15	-0.63*	-0.58*
t50	-0.60*	-0.64*

* p<0.05

age group swimmers; however, it does not clearly explain performance variability. Lack of specificity of this dry-land test in relation to in-water tests can explain the results.

Can a Halliwick swimming program develop water competence, static and dynamic balance in disabled participants?

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The Halliwick concept is an aquatic rehabilitation program aiming to enhance balance and core stability of disabled individuals. Previous studies focused on assessing the participants' satisfaction on Halliwick programs or the acquisition of water motor skills (Garcia et al., 2012).Yet, as far as our understanding goes there is not in the literature the assessment of the water independence or the transfer to land-based body balance and posture. Nine individuals (33±12.3 years) diagnosed with cerebral palsy (n=2), mental disability (n=4) and trisomy 21 (n=3) were took part in a Halliwick's 10-point programme. The programme had a duration of 15 weeks comprising one weekly session with one hour of duration. All sessions were planned and implemented by a trained therapist. In the beginning (W0) and in the end (W15) of the intervention programme it was assessed the water competence, static and dynamic balance. Water competence was assessed by the Water Orientation Test Align 2 (WOTA, in points) that is capped to 81 points (Tiroshi et al., 2008). Static balance was assessed by one-leg stance test (OST, in s) and functional reaching test (FRT, in m) according to standard guidelines. The Time up & go test (TUGT, in s) was selected as a measure of dynamic balance. Water competence measured by WOTA 2 showed significant improvements ($WOTA_{W0}$ = 39±11 vs $WOTA_{W15}$ = 57±16 points, p <0.01) between the beginning and end of the programme. Static balance also improved. There was a significant change in the OST (OST_{W0} = 15.56±12.88 vs OST_{W15} = 17.78±12.48 s, p = 0.04) and FRT (FRT_{W0} = 0.20±0.09 vs FRT_{W15} = 0.24±0.11 m, p <0.01) performances. Dynamic balance also improved ($TUGT_{W0}$ = 9.12±2.61 vs $TUGT_{W15}$ = 7.74±2.52 s, p = 0.01) after the 15th week. It can be concluded that 15 weeks of a well-designed Halliwick programme can improve water competence of disabled individuals. Concurrently, it was also noted a positive transfer of the skills acquired in water to on land body balance and posture. Hence, fitness and health practitioners should be aware of the water benefits to improve balance and core stability in disable populations.

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Effect of strength training in hypoxia on body composition and muscle performance

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Resistance training is the best way to cause muscular adaptations. Current guidelines state that loads of ≥65% 1RM are necessary to elicit favorable increases in hypertrophy (Kraemer et al., 2002; Kraemer & Ratamess, 2004). Besides this, the addition of hypoxic stimulus during resistance training is suggested to increase the metabolic responses, enhancing hypertrophy and muscle strength (Kon, Ikeda, Homma, & Suzuki, 2012). To determine the adaptations caused by hypoxia resistance training on strength and body composition. Sixteen untrained subjects participated in the study (weight: 74.68±12.89 kg; height: 1.75±0.08 cm; BMI: 24.28±3.80 kg/m2). A training period of 7 weeks in a hypoxia chamber under normobaric hypoxia conditions (FiO_2= 13%) was performed. At the beginning, resistance training consisted of maximum repetitions to failure at 65% 1RM, and then, every two weeks, intensity training increased to finish at 80%1RM. Initial and final measurements were taken. Body composition was determined through skin fold and muscle strength was evaluated with 1RM tests in the following exercises: bench press, bices curl, french press, rowing hip and half squat. A general linear model of repeated measures was performed to observe the differences in every variable. Increases were observed in muscle percentage, so the fat percentage decreased significantly. They also showed an increase in the perimeters of the arm, leg and thigh with respect