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*Original*

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**Methods.** A new exercise machine that allows the execution of chest press and row on upright position (upright press and upright row) has been designed. In order to verify if these methods are applicable to elite athletes, increasing load tests (strength - speed curve) have been made on female athletes of Italian Judo and Rugby National Team. The study has been made on 14 judo athletes, 6 of them training for Beijing Olympic Games 2008 and 12 of the National Rugby Team; aged  $26.7 \pm 3.9$  for judo,  $25.6 \pm 1.6$  for rugby, weight  $62.8 \pm 9.7$  for judo,  $66.1 \pm 9.7$  for rugby, height  $168.5 \pm 7.1$  for judo,  $166.1 \pm 6.7$  for rugby. The aim of this research was to verify the reliability of the test and how it is suitable for elite athletes.

**Results.** The results prove that either the standing pull or push have a good intra-tester reliability with positive statistical values: 1.4% for the pull and 0.97% for the push. Moreover, for the upright press and upright row the data show a good inter-day repeatability; with values between -9.1 e +11.4 % among different days for upright row and between -9.7 % e +7.7 % for upright press. We can attest that the measure system used has a good reliability and so it can be applied for the functional evaluation of elite athletes. It is not possible to extend this good reliability to non professional or younger athletes and further studies should be done for this purpose. Moreover, during the tests no athletes showed joint injury or pain.

**Conclusions.** In sports where you stand and with important contact phases with the opponent it is relevant to propose specific training exercises. In order to achieve a satisfactory reliability and for a good compliance as the athletes refer we can suppose to use the measure system suggested for the training planning and control.

### The effect on joint mobility after one-week training with karate-preparatory exercises vs sport games in children

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The aim of the present study was to analyze if the use of specific training vs sport games training has comparable impact on technical gestures and joint mobility in children who practice karate. Hundred-sixty-eight children were randomized in two groups: Karate Game (KG) (n=84) and Sports Game (SG) (n=84). All children have done two workouts a day (one hour in morning and one hour in afternoon) for a week. Before and after the training period, they underwent a battery test: throwing of the medicine ball, standing long jump, joint mobility and lateral and frontal jumps. KG group was trained in specific way, considering coordination, balance and joint mobility exercises aspects; SG group was trained playing mini-football and volleyball. After one week of training all subjects were analyzed, showing that the KG group only was improved (throwing of the medicine ball (+3%,  $p < 0.05$ ), standing long jump (+5.17%,  $p < 0.001$ ), joint mobility (+1.5%,  $p < 0.001$ ) and lateral/frontal jumps (+22.8%,  $p < 0.001$ ), while in the SG group there was significant improvement only in lateral jumps (+1.5%,  $p < 0.05$ ). From this study we demonstrated that exercise induces physical improvements but

the choice of exercises is important for the optimization of training and the technical development of children oriented towards a specific sport activities.

### Comparison of the effects of massage with mineral oil or ozonated oil bioperoxoil® on blood lactate, stress perceived and heart rate in cyclists

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Muscular fatigue is a factor that influence heavily performance of athletes. There is a lack of data about effect of massage with substances "ad hoc". The aim of our research was to investigate the effect of application of ozonated oil on some parameters linked to fatigue in cyclists.

30 cyclists male was divided in two groups of 15 (PLO = placebo oil; OZO = ozonated Oil). Subjects was submitted in two different session to work protocol that consist in a rectangular test on cycle-gometer followed by 30' of rest. After the rest athletes performed an incremental test. HR (heart rate), Wmax (Watt maximal), RPE (rate of Perceived Exertion) and Lab(Blood Lactate) was misured at the end and after 5' and 10' after the test. In the first session (PS) subjects remained at completely rest after rectangular test (30' rest), in the second session athletes executed a self massage (MS) on lower limbs with OZO or PLO during rest.

Results shows that 10' after test massage "di per se" may reduce the Lab 1) but there was a greater  $\pm 0.6$  vs PLO MS 10'  $6.3 \pm (PLO PS 10' Lab 7.4 0.9$  vs OZO MS 10'  $\pm$  significant reduction with ozonated oil (OZO PS 10' Lab 7.6 1.3). There was no significant difference on HR and Wmax whilst there was  $\pm 4.2 0.4$  vs  $\pm$  significant difference on RPE within the groups (PLO PS vs PLO MS 17.6 0.8) and between massage with  $\pm 0.2$  vs  $15.7 \pm 1$ ; OZO PS vs OZO MS  $17.3 \pm 16.6 0.8$ ).

In conclusion our study  $\pm 1$  vs  $15.7 \pm$  OZO or PLO (PLO MS vs OZO MS 16.6 demonstrate that massage "di per se" may reduce blood lactate and RPE after intense exercise but also that massage with ozonated oil may increase benefits of massage.

### The meteo-hydrological analysis and the sport performance: which are the connections? The case of the XXI Winter Olympic Games, Vancouver 2010

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The main goal of this research is to show how the climatological and meteorological analysis, relatively to a determinate geographical zone and with reference to a specific period of interest, are able

be used in sport area for the amelioration of the athlete's performance. For this reason it was decided to contextualize the analysis to the competition field of the XXI Winter Olympic Games, held in Canada (Vancouver-British Columbia) in February 2010. The central part of the work consists in the examination of historical series of temperature, precipitation, relative humidity and wind; moreover, the whole data analysis has been completed with the study of climatological phenomenon on different scale, verifying the existence of recurrent meteorological pattern.

The gotten results from this study have shown how Niño's conditions, that have characterized February 2010, were predictable since October 2009; so, far in advance, we would be able to await higher temperatures in comparison with the average ones and, with similar altitude, a greater quantity of rainy precipitations.

The research is integrated with the evaluation of the bio-climatological aspects and with the study of the influence of atmospheric variables on carrying out the physical activity. Using the climatic index NET, we have demonstrated how the combined action of wind and humidity can contribute in decreasing the value of perceived temperature even of 6°C.

In conclusion, by applying the "S.F.E.R.A." model and the natural evolution of the "Noo S.F.E.R.A.", it's been possible to develop a "performance analysis" on some athletes participating to different competitions in alpine skiing during Vancouver's Olympic Games. This analysis has underlined how the uncertainty level resulting from the meteorological aspects is among the most substantial one, this confirm that the athlete's performance are strongly influenced by environmental conditions.

### Movement variability and stability in aerobic gymnastics at different skill levels

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Sport performance during closed skills execution combines body movements into codified patterns. High levels of movement consistency are believed to be typical of skilled athletes: once a skilled performance has been achieved, the ability to optimally refine these characteristics will likely result in a consistent performance with low variability.

In this study, we analyzed the variability of body trajectories between expert and novice gymnasts executing a competition element. Eleven female gymnasts (6 novice, 5 expert) performed 10 repetitions of a complex jump (air turn to split), an element of aerobic gymnastics competition. On each gymnast, the 3D coordinates of 12 body landmarks were recorded by a motion analyzer, and a 3D reconstruction of the movement trajectories of center of mass (CoM) was performed. Five variables representing pre-jump height, jump height, pre-jump length, jump length and coupling time were determined.

To assess execution variability, the coefficient of variation (CV) was calculated across the 10 repetitions for each variables. To quantify local dynamic stability, the Lyapunov exponents (LyE) were computed for ensemble time series of CoM displacements.

No significant differences between groups were observed in the CV ( $p>0.05$ ). LyE values were comprised between 0.05 and 0.10.

When comparing LyE of latero-medial displacements, a significant ( $p=0.009$ ) higher level of stability was identified in the novice group. No differences were shown for antero-posterior and vertical pattern stability of CoM.

Contrary to predictions, there was not a clear pattern of reduction in variability with increasing skill level as reported in a previous study<sup>1</sup>. However, a high level of stability was identified, suggesting that the movement patterns were consistent in both groups.

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### Strength performances in aerobic gymnastics

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Aerobic Gymnastics is the ability to perform continuous complex and high intensity movement patterns to music, which originate from traditional aerobic exercises: the routine must demonstrate continuous movement, flexibility, strength, with perfectly executed all the movements including the difficulty elements. The definition of the performance model of a discipline that has been emerging recently but that, up to now, has not been examined deeply by the scientific world, is a fundamental step.

For our purpose, sixteen interregional aerobics athletes, aged between 8 and 18 years, have been examined. The aim of the study was to valuing the strength performances of this group and to compare them to the performances of similar sports. In order to examine this comparison, we employed a set of tests calculating the different features of explosive muscular strength for the upper and lower limbs. The tests were: Squat Jump (SJ), Counter Movement Jump (CMJ), Counter Movement Jump with Free Arms (CMJas), Stiffness Test, Multiple Jumps 15" and Bench Press. The average height in SJ test was  $23.8\pm 0.6$  cm, in CMJ  $24.9\pm 1.7$  cm, in CMJas  $30.6\pm 1.1$  cm, in Stiffness Test  $143.76\pm 10.54$  Nm, in Multiple Jumps 15"  $22.4\pm 2.9$  cm, whereas for the upper limbs the mean value was  $170.51\pm 45.32$  W in Bench Press test.

The results of the lower limb explosive force and reactivity are a little higher than the results obtained by gymnastics athletes of the same age and the same qualifying level; nevertheless, these data are lower in comparison with the data from other sports activities.

Although literature does not show any comparison for the Bench Press test with the same age athletes, the parameters cannot be considered very high. From that, we can easily understand that the explosive force in general is not sufficiently developed for reaching higher technical objectives. Even though the results are not satisfactory, the level is in line with national athletes.

### Development of a sport-specific test battery to assess climbing performance

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