

Influence of sports on the control of static balance in physical education at school

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Abstract:

The ability to maintain and control the balance is the basis for the design and construction of more complex motor skills in the context of sports performance. The purpose of this study is to verify whether the training sports at a competitive level can affect the postural control in static conditions, in particular we want to determine whether the boys practicing basketball show a better postural control than the group of swimmers, which are not usually trained to the maintenance and control of static balance anti-gravitary, and also compared to the control group. To this end were administered 2 types of tests (on support bi-podalic and mono-podalic) with eyes open and eyes closed, in order to compare and evaluate the possible influences of some sporting performance on the control of static balance. Precisely were examined postural performance of 3 groups of children between 11 and 13 years, of which 2 groups practicing different sports at a competitive level (basketball and swimming) and a third group who practice non-competitive sports activities.

Key Words: motor control, motor learning, postural assessment, performance

Introduction

The ability to maintain and control the balance (Shumway-Cook & Woollacott, 2001) is the basis for the design and construction of more complex motor skills in the context of sports performance. In basketball, such as physical activity at school (Raiola 2011ab 2012), young athletes are subjected to exercises with a high degree of postural instability, so you need a particular type of workout that stimulates the static and dynamic balance. In swimming instead (Tursi et al. 2013), young athletes are subjected to a limited extent to the effects of gravity, because it uses a type of training that aims at the development of a specific motor coordination of the various techniques and the sense of swimming in the water. A basketball player has more opportunities to hone his kinesthetic sensitivity at the level of antigravity muscles and the sole of the foot; the latter represents the contact surface, from which flows the quality of the movements in the various game situations. Which means the motor control and learning are the basic on the statics (Raiola et al. 2014). It is desirable to expect a different effect on the ability to balance control in relation to the type of sport. Several studies in the literature, agree in saying, that adequate evaluation protocols and programs to enhance physical activity, as well as muscle strength and endurance, even balance, joint mobility and posture (Rose & Clark, 2000; Rose & Hernandez et al 2010). "These activities are also investing aspects of interdependence as the experience, learning, memory and emotion" (Altavilla et al. 2014). Furthermore, in biomechanics the motor control activity is studying without the qualitative aspects of learning process. In a holistic vision it should be investigated with the contribution of mind theories according ecological perspective (Raiola 2014).

Material and method

Experimental procedure with test balance in three groups. It has analyzed 45 boys aged between 11 and 13 years old, all male, 15 of which are part of the control group who did not practice a sport at a competitive level. A second and third group, each consisting of 15 boys practicing basketball and swimming at a competitive level. Were first reported anthropometric data: age, height and weight; of these were calculated the average and the standard deviation tab. 1 - 2 - 3. The measured data were subjected to statistical analysis of descriptive type, in order to obtain a quantitative comparison between the 3 groups.

Table 1. Anthropometric data

Age	Basketball team	Swimming team	Control group team
1	11	11	11
2	11	11	12
3	11	12	13
4	13	12	11
5	13	12	12
6	13	12	13
7	11	13	11
8	11	13	11
9	11	11	12
10	11	12	12
11	12	12	12
12	12	13	13
13	11	12	13
14	12	11	11
15	12	11	13
Average	11,67	11,87	12
SD	0,82	0,74	0,85

Table 2. Anthropometric data

Height	Basketball team	Swimming team	Control group team
1	155	154	163
2	157	161	158
3	156	157	160
4	167	161	159
5	165	164	155
6	168	160	157
7	157	158	156
8	158	157	162
9	157	161	155
10	156	163	157
11	160	158	156
12	166	160	157
13	160	159	156
14	165	160	162
15	165	163	157
Average	160,80	159,73	158,00
SD	4,65	2,66	2,62

Table 3. Anthropometric data

	Basketball team	Swimming team	Control group team
N°	15	15	15
Average age	11,67	11,87	12
SD	+/- 0,82	+/- 0,74	+/- 0,85
Average weight	50,07	49,6	51,6
SD	+/- 3,22	+/- 1,88	+/-2,80
Average height	160,8	159,73	158
SD	+/- 4,65	+/- 2,66	+/- 2,62

The subjects of the study were then subjected to two tests (Fig. 5-6) commonly used in the quantitative assessment of the ability of postural basis, both performed first with eyes open and then with eyes closed on a platform feet-barometric.

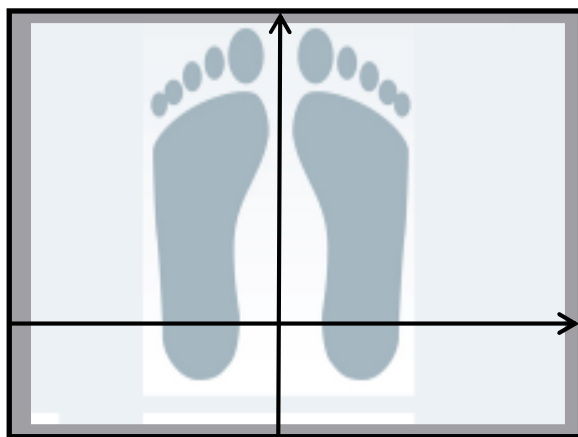


Fig. 1 – Support bi-podalic

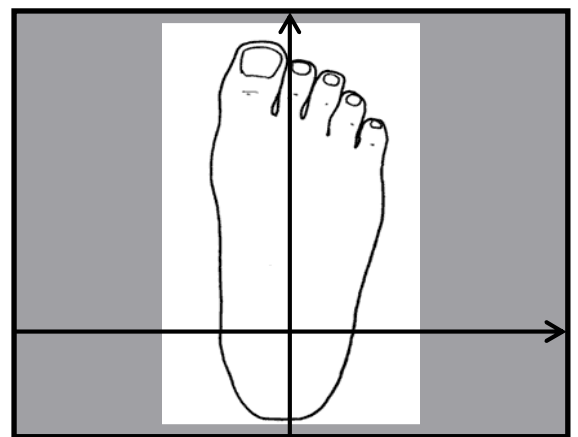


Fig. 2 – Support mono-podalic

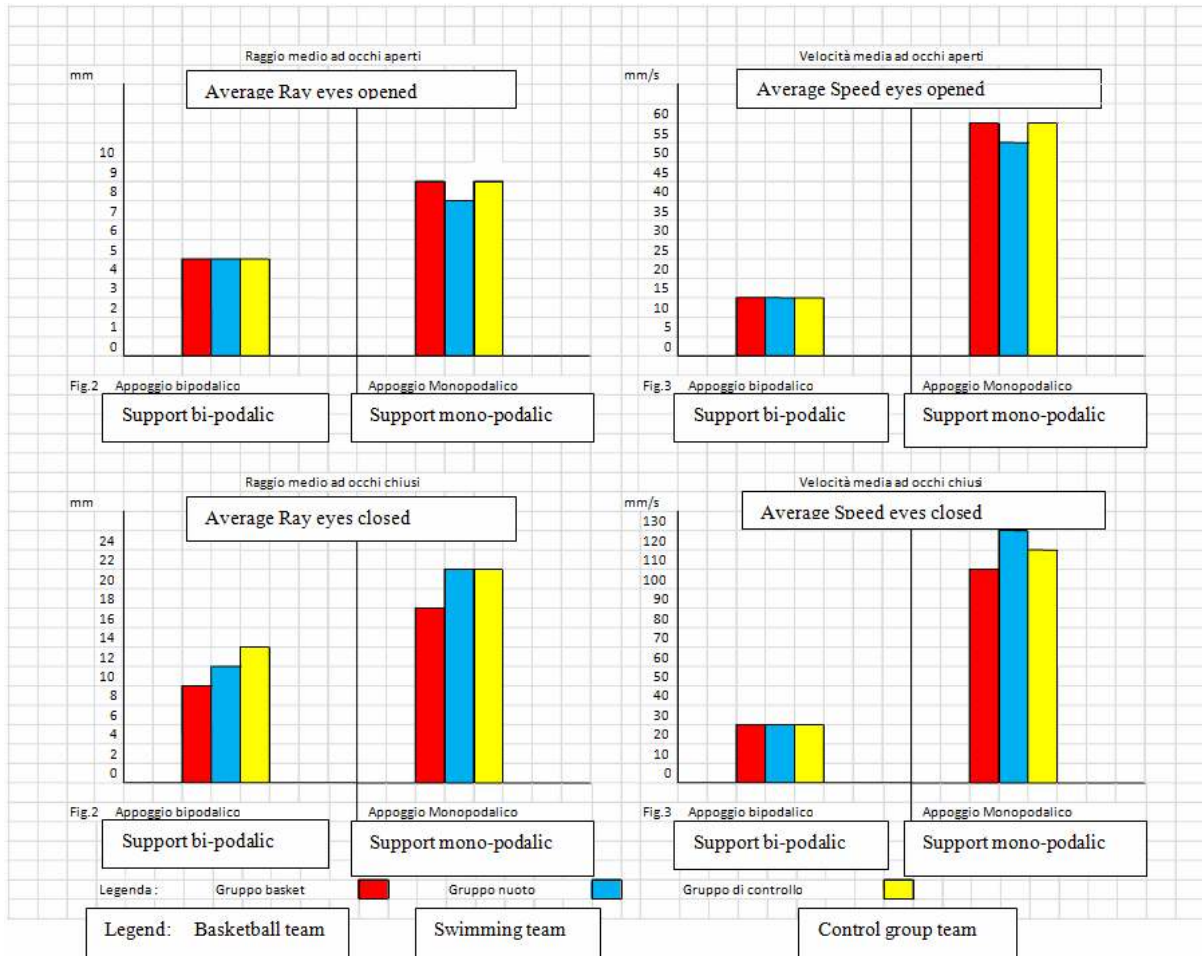
The first test: erect posture with feet together with arms outstretched at your sides and on both feet for a duration of 30 seconds.

The second test: upright posture in single stance limb dominance, for a period of 15 seconds.

The postural variation was measured through a footboard feet-barometric able to detect the fluctuations of the center of pressure (CoP) of the support base. From the data it was possible to obtain some useful values for the quantitative assessment of static equilibrium of the subjects examined, namely: the Average Ray (RM); the Average Speed (VM).

High values of (RM) indicate high postural instability, while high values of (VM) indicate a significant activity of postural balance.

Results



Discussion

The tests performed with open eyes arising values (RM) and (VM) are very similar across the three groups; this indicates that the postural control with eyes open does not appear to be influenced by the practice of sports under consideration. In the tests performed with eyes closed, however, there was a different response in relation to the difficulties of the proposed test; In fact, in the test bi-podal minimal differences were found between the groups examined; while in the test mono-podal differences are evident and significant. It can, therefore, say that in tests with closed eyes (when balance is more involved) there is a different skill in the three groups. The boys practicing basketball show a better postural control with eyes closed compared to the control group and even more so compared to the group of swimmers (basketball requires a greater balance control, both static and dynamic, as compared to other team sports, to make a more specific technical movements and use of the body in a coordinated manner, so that we can control and direct the ball to a teammate or basket). "A non-solicitation, even in the presence of a strong capability, will never make significantly disabled nor able to learn new motor tasks" and so on the effects of muscle stretching (Altavilla, 2014).

Conclusions

The aim of this work was to verify whether the training sports at a competitive level could affect postural control in static conditions in young athletes between 11 and 13 years. We can say that the maintenance of balance is similar in the three groups considered (basketball, swimming and control groups) in the test bi-podal, and because this test is easier to implement and because it is a posture which is usually assumed by each subject. Postural control in the test mono-podal with your eyes closed is strongly influenced by the type of exercise practiced by the boys; In fact, the group of basketball has a better ability than the group of swimmers. The control of static balance in the test mono-podal by the group of swimmers seem to be more controlled by visual system and less than from the vestibular and kinesthetic. This leads to the conclusion that the group of

swimmers show lower performance both in the conduct of the test group compared to basketball (influenced by the type of training their discipline) that a poor ability to balance control with your eyes closed. It is useful to reply the study before and after some virtual activity by exergames (Di Tore, Raiola 2012) and to test the results.

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