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Original Article

Application of methodology to reduce the performance of non-disabled athletes

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Abstract
The aim of this study is to verify, from a physical point of view, through an analysis of qualitative and quantitative differences if sightless athletes can eliminate, or reduce as much as possible, major differences between them and non-disabled athletes. This investigation is focused on the research of a methodology to reduce non-disabled athletes' performances in order to allow the development of a unite competition between them and competitive athletes, belonging to S11-13 categories (visual impairment). A series of two-group tests of athletes have been proposed: Group A formed of ten non-disabled athletes with an age between 16 and 18 years old and Group B formed of ten athletes affected with disabilities and with an age between 16 and 18 years old. These tests allowed the evaluation of athletic skills of swimmers at the beginning and later at the end of a training program for both groups. The training imposes a first part focused on the improvement of the swimming technique with targeted workouts: an inclusive gym environment to be attended three times a week for strength and resistance enhancement and pool workouts subdivided in 70% aerobic, 24% intense aerobic and 6% anaerobic and speed exercises. This kind of training would help athletes to improve their physical condition and allows also the development of a united competition between the two groups. The results have been compared by using Student t-test for two samples paired. This comparison between pre-workout and post-workout data led to an improvement on in athletes affected with a visual disability, reducing the number of strokes for length and an improvement of performances for 50 metres length.
Key words: Swimming, Paralympic Swimming, Visual Impairment, improvement.

Introduction

The Paralympic Swimming involves a bunch of competitions at national level. These competitions are adapted according to athletes' disabilities (Raiola et al., 2020; D'Elia et al, 2020; Altavilla et al, 2020; Di Domenico et al, 2020). In contrast to swimming, which imposes a series of classifications according to athletes' ages, each category serves as and represents a fundamental part in Sport, because it offers the possibility of competing at equal level (Raiola, 2020) and achieving a sports inclusion (Raiola, 2015). In Paralympic Swimming the classification establishes the assignment of a number from 1 to 10 if concerning athletes with physical disabilities.

While categories 11, 12, 13 are for sightless athletes. For athletes with visual impairments (Altavilla et al, 2014), improvements in performances follow the same training methodology planned for non-disabled athletes. That is because of the unnecessariness of adapting motor gestures (D'Elia et al, 2020; Latorella et al, 2020) to physical disabilities (Cascone et al, 2020), technological instruments for disabled appropriate (Boccia et al, 2019; Izzo et al, 2020) and the consequent performance evaluation (D'Isanto et al, 2019).

Paralympic Swimming is a variety of traditional swimming which is practiced by disabled athletes. International competitions, including the Paralympic Games, are organized by IPC Swimming. In Italy, the Paralympic Swimming organisation and regulation is referred to FINP for what concerns physical disability. While for what concerns intellectual disability, it is put in charge the FISDIR.

Swimming classification is realized out of a division in categories according to ages, while the Paralympic swimming classification is functioning just for athletes with physical disabilities, to whom it is assigned a number from 1 to 10 – considering number 1 as the most dangerous disability.

After a specialized medical examination, sightless athletes compete in categories 11,12 and 13. Although the category 14 belongs to swimmers affected with intellectual disabilities, of whom there were just ensured the expected requirements. Distances covered in swimming are ordered by the Fédération Internationale de la Natation Amateur, athletes compete in each of the four styles and in different distances. For what concerns the agonistic activity, swimming for disabled people is controlled by technical rules fixed by IPC SWIMMING and it integrates rules set by FINA (International Swimming Federation).

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Tab. 1 - Swimming classification

	Swimming (Distances)	ParalympicSwimming (Distances)
Crawl	50m,100m,200m,400m,800m,1500m (confined waters) 5000m, 10000m and 25000m (open waters)	50m,100m,200m,400m (confined waters) and 5km (open waters)
Backstroke	50m, 100m and 200m	50 and 100m
Breaststroke	50m, 100m and 200m	50 and 100m
Butterfly	50m, 100m and 200m	50 and 100m
Mixed	100 (just in short lengths), 200m and 400m	150m and 200m
Relay	4x50 (just in short lengths), 4x100m crawl, 4x200m crawl and mixed relay 4x100m	4x100m Crawl/mixed, 4x50 Crawl/mixed

Regulations of swimming for disabled people have some differences with the ones used in traditional swimming, for example in the starting, in the butterfly, in the breaststroke and some different rules also for blind swimmers.

Blind Swimmers

- Obligate of using completely shaded goggles for the category S11.
- The turns and arrives are reported by an assistant called Tapper, that must touch athlete's head or shoulder with a cane that ends in rubber (usually a little ball).
- Inclusion of a Tapper is obligatory for class S11.

Athletes with visual impairment have problems with orientation during competitions. They tend to increase distances and sometimes bump against lane sides, reducing the possibility of a high rated performance (Di Domenico, 2020). Can swimmers belonging to categories S11-13 (visual impairment) eliminate or, at least, reduce as much as possible differences with non-disabled athletes in performing features and so conduct a united competition? The purpose of this study is to verify, from a physical point of view, through an analysis of qualitative and quantitative differences (D'Isanto, 2016; Cirillo et al, 2016; Sannicandro, 2020), if sightless athletes can eliminate, or reduce as much as possible, the differences between them and non-disabled athletes (D'Isanto, 2020; Raiola, 2017). Firstly, with a general evaluation of athletes' contingent capacities and then with the application of a unique workout program, thought to reduce differences in performing features (Altavilla et al., 2019).

Material and Methods

In order to analyse these differences in practical performances, two groups of athletes are taken into account: Group A formed of ten non-disabled athletes with an age between 16 and 18 years old and Group B formed of ten athletes affected with disabilities and with an age between 16 and 18 years old (table 2). They have voluntarily taken part in this research. Athletes undergo a training constituted of a first part pointed toward a swimming technique improvement, through individual targeted exercises and the inclusion of gym workout (three times a week) in order to enhance strength and resistance, through training circuits and water workouts subdivided in 70% A workout (light aerobic), 24% B workout (intense aerobic) and 6% C workout (anaerobic and speed trainings), throughout 8 weeks. As a statistical model, a t-test for samples paired has been used, that is a parametrical test which verifies if the average value of a distribution would move away from the initial value of reference, allowing so an evaluation of possible improvements following the attendance of this workout program.

Tab. 2 – Averages and SD of two groups

	Group A (n=10)		**Group B (n=10)**	
	Average	SD	Average	SD
Age	16.8	± 0.84	17	± 0.71
Height (cm)	182.5	± 5.31	180.1	± 4.54
Weight (kg)	74.5	± 4.82	75.4	± 6.88
BMI (kg/ m²)	22.3	± 1.26	23.2	± 1.51

Results

Athletes were evaluated before workout, reporting all data in a table and successively also post-workout data were acquired. This allowed the evaluation of possible average differences, through the statistical method of t-test.

Tab. 3 – PairedSamples t-test on 400 meter (Group A)

	PairedDifferences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR01 - VAR02	3,20000	1,03280	,32660	2,46118	3,93882	9,798	9	,000

Table 3 shows a significantdifferencebetween the twoseries of 400 meterbefore and after the period of 8 weeks of training (p = 0.000) for the group A.

Tab. 4 – PairedSamples t-test on 400 meter (Group B)

	PairedDifferences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR01 - VAR02	,20000	,11547	,03651	,11740	,28260	5,477	9	,000

Table 4 shows a significantdifferencebetween the twoseries of 400 meterbefore and after the period of 8 weeks of training (p = 0.000) for the group B.

Tab. 5 - PairedSamples t-test on 50 meterlengths(Group A)

	Paired Differences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR01 - VAR02	,20000	,11547	,03651	,11740	,28260	5,477	9	,000

Table 5 shows a significantdifferencebetween the twoseries of 50 meterlengthsbefore and after the period of 8 weeks of training (p = 0.000) for the group A.

Tab. 6 - PairedSamples t-test on 50 meterlengths (Group B)

	Paired Differences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR01 - VAR02	,56000	,34383	,10873	,31404	,80596	5,150	9	,000

Table 6 shows a significantdifferencebetween the twoseries of 50 meterlengthsbefore and after the period of 8 weeks of training (p = 0.001) for the group B.

Tab. 7 – PairedSamples t-test on Swimmingspeed (Group A)

	Paired Differences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR05 - VAR06	-,02000	,00667	,00211	-,02477	-,01523	-9,487	9	,000

Table 7 shows a significantdifferencebetween the twoseries of Swimmingspeedbefore and after the period of 8 weeks of training (p = 0.000) for the group A.

Tab. 8 – PairedSamples t-test on Swimmingspeed (Group B)

	PairedDifferences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR05 - VAR06	-,01600	,00843	,00267	-,02203	-,00997	-6,000	9	,000

Table 8 shows a significantdifferencebetween the twoseries of Swimmingspeedbefore and after the period of 8 weeks of training (p = 0.000) for the group B.

Tab. 9 – PairedSamples t-test on Relation time/strokes rate (Group A)

	Paired Differences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR07 - VAR08	-,03000	,01886	,00596	-,04349	-,01651	-5,031	9	,002

Table 9 shows a significantdifferencebetween the twoseries on Relation time/strokes rate before and after the period of 8 weeks of training (p = 0.002) for the group A.

Tab. 10 – PairedSamples t-test on Relation time/strokes rate (Group B)

	Paired Differences					t	df	Sig.
				95% ConfidenceInterval of the Difference				
	Mean	Std. Deviation	Std. ErrorMean	Lower	Upper			
VAR07 - VAR08	-,05600	,02547	,00806	-,07422	-,03778	-6,952	9	,000

Table 10 shows a significantdifferencebetween the twoseries on Relation time/strokes rate before and after the period of 8 weeks of training (p = 0.000) for the group B.

Discussion

As it could be inferred from tables from to 3-10, in both groups there have been significant improvements, mostly for the Group B (disabled people). They had an improvement in CSS (Critical Swim Speed), advantageous for the evaluation of maximum use of oxygen, an improvement in the frequency of strokes (which foster a significant reduction in total time during a competition) and they also had an improvement in performance time during the 50 metres. The T-test allowed a comparison between pre- and post-workout averages for both the groups in order to know if the detected differences confirmed the efficacy of this training program or were just due to chance. In tables from to 3-10, it is clear that there has been an improvement in performances in different tests (400meter, 50 metres lengths, swimming speed and relation time/strokes rate) in both groups. The statistical model (the paired samples t-test) highlighted the most significant improvements comparing pre-workout with post-workout data, ones these tested, as it is clearly visible in tables, to an improvement of athletes affected with visual disability. Such improvement has reduced the number of strokes for length and also an improvement of performances for 50 metres length.

Conclusion

The choice of a unique workout program highlights although athletes with visual impairment would have difficulties in orientation during competitions, they had far more evident improvements. The comparison between pre-workout and post-workout data led to an improvement of athletes affected with visual disability. Such improvement has reduced the number of strokes for length and also an improvement of performances for 50 metres length. Nevertheless, performances of athletes belonging to categories S11-13 are distant from those of non-disable athletes. That is why S11-13 and non-disable athletes have not been integrated in a unique competition yet. In order to do that, it could be useful to let disables athletes wear flippers: the use of flippers has led to an improvement in performances around 14% and 20%. That is because of the augmentation of strength produced by the legs and an augmentation in athlete's buoyancy, which allows a reduction of friction with water that reduces the performance gap between disabled and non-disabled athletes. Another possibility may be making non-disabled athletes wearing the same shaded goggles that will cause them the same orientation problems.

References

Altavilla, G., D'Isanto, T., & D'Elia, F. (2020). The educational value of rules in basketball. *Journal of Human Sport and Exercise, 15(4): S1195-S1203.*

Altavilla, G., D'Elia, F., D'Isanto, T., Manna, A. (2019). Tests for the evaluation of the improvement of physical fitness and health at the secondary school.*Journal of Physical Education and Sport,19 (Suppl. 5): 1784-1787.*

Altavilla, G., Furino, F., Raiola, G. (2014). Body, communication and visual impairment. *Acta Kinesiologica, 8 (1): 50-52.*

Boccia, S., Izzo, R., D'elia, F., Fattore, S. (2019). A wheelchair by the overboard model: A technological instrument for disabled basketball players, *Journal of Human Sport and Exercise, 14 (4): S1080-S1086.*

Cascone, C., De Cesare, G.R., & D'Elia, F., (2020).Physical education teacher training for disability. *Journal of Human Sport and Exercise, 15(3): S634-S644.*

Cirillo, G., Nughes, E., Acanfora, A., Altavilla, G., D'Isanto, T. (2016).Physical and sport education testing by quantitative and qualitative. *Sport Science 9(Suppl. 1): 97-101.*

D'Elia, F., Sgrò, F., &D'Isanto, T. (2020). The educational value of the rules in volleyball. *Journal of Human Sport and Exercise, 15(3): S628-S633.*

D'Elia, F., Tortella, P., Sannicandro, I., D'Isanto, T. (2020). Design and teaching of physical education for children and youth. *Journal of Human Sport and Exercise, 15(4): S1527-S1533.*

D'Isanto, T. (2020). Sports skills in sitting volleyball between disabled and non-disabled people, *Journal of Physical Education and Sport, 20(3):1408-1414.*

D'Isanto, T. (2016). Pedagogical value of the body and physical activity in childhood. *Sport Science, 9(Suppl. 2):13-18.*

Di Domenico, F., Sannicandro, I., Altavilla, G. (2020). The educational value of the rules in five-a-side football, *Journal of Human Sport and Exercise, 15(3): S645-S655.*

Di Domenico, F. (2020). From biomechanics to learning: Continuum for the theory of physical and sports education, *Journal of Human Sport and Exercise, 15 (2):S268-S278.*

Izzo, R., Raiola, G., D'isanto, T., Cejudo, A., Giovanelli, G.M. (2020). Modelling an adequate profile for a more targeted work methodology, with dedicated technologies, for elite-level footballers: Comparison between sub 17 vs sub 19, highlights and shadows, *Sport Science, 13(1): 36-42.*

Latorella, V., Di Domenico, F., Altavilla, G. (2020). Neuromuscular adaptations to a motor skills training program for adults with intellectual disabilities. *Journal of Human Sport and Exercise, 15 (Suppl.3): 676-687.*

Raiola, G. (2015). Inclusion in sport dance and self perception, *Sport Science, 8 (1): 99-102.*

Raiola, G., (2017). Motor learning and teaching method. *Journal of Physical Education and Sport, 17(5):2239-2243.*

Raiola, G., Invernizzi, P.L., Scurati, R., Fattore, S. (2020). The educational value of the rules in handball. *Journal of Human Sport and Exercise, 15(4): S1214-S1223.*

Raiola, G. (2020). Proposal of rearrangement of physical training and sport sciences methodology academic disciplines in italian university body. *Sport Science, 14 (1):43-47.*

Sannicandro, I. (2020). Ecological dynamics approach in the youth soccer: A short narrative review. *Journal of Human Sport and Exercise, 15(4): S1133-S1139.*