Proceeding

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Arm stroke: a comparative analysis between competitive swimming and water polo athletes

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ABSTRACT

Tursi D, Napolitano S, Di Tore PA, Raiola G. Arm stroke: a comparative analysis between competitive swimming and water polo athletes. *J. Hum. Sport Exerc.* Vol.8, No. Proc2, pp. S314-S322, 2013. Water polo is a team sport and efforts of high intensity are made in less duration, where the players must swim, hyperextension, takes and send the ball with moments of rest or low intensity, where the players conduct battles against their opponents throughout contacts type (Smith, 1998; Wakayoshi, 1992). "Water polo consists of high intensity bursts of sprinting, interspersed with short periods of low to moderate intensity swimming". (Hohmann & Frase, 1992). In this perspective, swimming condition is obviously an important aspect of training for Water Polo. In swimming, conditioning training assumes a consistent role to achieve the better goals (Raiola et al., 2011). The arm stroke used in water polo is a lot shorter and quicker and is used primarily to protect the ball. The aim of this study is to demonstrate that training for water polo athletes is most proficiency when the sport activity is played always by the athletes with the ball, as the ball-handling does not adversely affect the timing. The hypothesis is that the ball-handling does not affect significantly swimming times swim in water polo athletes of high level. The purpose of the present study is to verify the incidence of ball handling in swimming intensity in water polo, in order to obtain useful indication in coaching. The research method is integrated and consists of action research for coach contribution by training and evaluation, and theoretical-argumentative to deduce a framework in which define the data processing. Eleven well-trained competitive athletes were recruited and asked to swim 5 x 20-m, one time with ball, and one time without ball. **Key words**: PERFORMANCE ANALYSIS, TRAINING, BALL-HANDLING.

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INTRODUCTION

Water polo is a team sport and efforts of high intensity are made in less duration, where the players must swim, hyperextension, takes and send the ball with moments of rest or low intensity, where the players conduct battles against their opponents throughout contacts type (Smith, 1998; Wakayoshi, 1992). "Water polo consists of high intensity bursts of sprinting, interspersed with short periods of low to moderate intensity swimming" (Hohmann & Frase, 1992). In this perspective, swimming condition is obviously an important aspect of training for Water Polo. In swimming, conditioning training assumes a consistent role to achieve the better goals (Raiola et al., 2011). The arm stroke used in water polo is a lot shorter and quicker and is used primarily to protect the ball. The aim of this study is to demonstrate that training for water polo athletes is most proficiency when the sport activity is played always by the athletes with the ball, as the ball-handling does not adversely affect the timing. The hypothesis is that the ball-handling does not affect significantly swimming times swim in water polo athletes of high level.

The purpose of the present study is to verify the incidence of ball handling in swimming intensity in water polo, in order to obtain useful indication in coaching. The research method is integrated and consists of action research for coach contribution by training and evaluation, and theoretical-argumentative to deduce a framework in which define the data processing. Eleven well-trained competitive athletes were recruited and asked to swim 5x20-m, one time with ball, and one time without ball. This test was repeated three times. For each swimmer was calculated the mean and standard error of times per test, both with and without the ball. Analysis was conducted individually for each athlete, and in total for each test. The results, trough confrontation of means of times, reveals a high variability, and indicate a non mechanical incidence of ball handling on swimming intensity. Reading this results in correlation to athletes anamnesis reveals that incidence of ball-handling is significant only in athletes who have a swimming-oriented athletic history, but there are not significant differences in times for athletes who have a water polo oriented athletic history.

The results show as this study can help the coach to train the team for improving the analysed skills in different mode, creating a methodological system training to enhance the performance.

Coaches are suggested to carefully monitor swimming rhythm during trials, and to increment ball-handling in every training condition.

MATERIAL AND METHODS

Eleven well-trained competitive athletes were recruited and asked to swim the test of the 300 fastest (15 reps of 20 meters), one time with ball, and one time without ball. For each swimmer was calculated the mean and standard error of times per test, both with and without the ball. Analysis was conducted individually for each athlete, and in total for each test. All performances were recorded and analyzed by Kinovea to detect angles and extensions of strokes.

Analysis of the data collected shows that the water polo players of the highest level (Starace & Valkai) do not have significant changes in chronometric. While, for the athletes coming from competitive swimming (Guillet & Giuliani), ball-handling has a clear and negative impact on swimming development.

Table 1. *Test 300, without ball*

Start	0	45	30	15	0	35	10	45	20	55	20	45	10	35	0		
ATLETE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean	Time
VALKAI	12,34	12,44	12,60	12,07	12,60	12,47	12,56	12,44	12,87	12,35	12,91	12,94	12,78	12,39	12,75	12,56733	3,09
GUILLET	11,56	11,94	12,58	12,24	12,16	12,44	12,81	13,25	12,59	12,50	13,68	13,28	13,69	13,97	14,09	12,852	3,13
STARACE	13,50	12,31	13,40	12,80	13,20	12,90	13,00	12,87	13,75	12,93	13,46	14,37	14,50	14,72	14,78	13,49933	3,22
GIULIANI	11,87	12,44	12,31	12,13	12,18	12,50	12,81	12,43	12,66	12,82	12,66	13,52	13,28	13,13	13,62	12,69067	3,10,36
PELLEGRINO	13,87	13,37	14,01	13,32	13,88	14,15	13,96	14,34	14,03	13,87	13,58	15,87	15,85	16,79	15,69	14,43867	3,36,58
DE SIMONE	13,97	14,00	14,22	13,75	13,87	14,90	14,65	15,34	15,31	16,10	16,57	16,21	17,72	17,62	17,03	15,41733	3,51,26
CIAMPICHETTI	13,43	12,71	13,25	13,37	14,03	14,12	14,34	14,22	14,78	15,34	16,78	16,00	16,11	16,56	16,40	14,76267	3,41,44
DI MONACO	13,18	13,19	13,41	13,75	13,90	14,37	14,90	14,22	14,84	14,66	15,94	15,38	15,03	15,75	15,87	14,55933	3,38,39
MASCIANDARO	13,93	13,78	13,53	13,36	12,80	13,08	13,52	13,78	13,55	14,25	15,33	15,38	16,12	16,00	15,28	14,246	3,33,69
CICCARIELLO	13,13	13,78	14,13	14,00	14,25	13,62	14,68	14,75	14,88	14,69	15,38	16,50	16,97	18,38	17,93	15,138	3,47,07
ANASTASIO	13,82	13,50	13,31	13,66	14,09	14,50	14,81	14,91	14,81	14,44	14,94	15,62	15,56	15,87	16,65	14,69933	3,40,49

Table 2. *TEST 300, with ball*

Start	0	45	30	15	0	35	10	45	20	55	20	45	10	35	0		
ATLETE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean	Time
VALKAI	12,95	12,24	13,02	12,12	12,73	12,02	13,09	12,30	12,31	12,15	13,30	13,02	13,05	12,71	13,05	12,67067	3,10,00
GUILLET	13,61	12,61	13,71	13,27	13,90	13,61	13,43	13,01	13,47	13,77	14,12	13,96	14,06	14,08	15,18	13,71933	3,26,00
STARACE	13,49	12,30	13,21	11,99	13,34	13,17	13,05	12,71	13,49	13,34	13,90	13,98	14,24	13,46	13,89	13,304	3,20,00
GIULIANI	12,70	14,77	13,42	12,88	13,62	13,83	13,18	13,18	13,18	13,82	14,29	13,77	14,33	14,02	14,13	13,67	3,25,12
PELLEGRINO	13,21	12,64	13,31	12,64	13,44	13,05	13,62	13,46	14,09	13,77	14,99	14,67	14,74	14,68	14,84	13,81	3,27,15
DE SIMONE	14,49	12,98	13,33	13,46	13,80	13,45	13,40	13,92	14,49	14,59	15,86	15,58	16,18	15,72	15,99	14,48267	3,37,24
CIAMPICHETTI	13,93	14,11	14,49	14,77	15,07	15,09	15,78	15,90	17,09	16,62	17,76	18,08	18,40	18,33	19,02	16,296	4,04,44
DI MONACO	12,80	13,33	13,80	13,23	13,52	18,18	15,21	14,33	13,27	14,77	15,96	16,70	16,93	15,96	16,17	14,944	3,44,18
MASCIANDARO	13,12	13,21	14,59	13,92	13,70	13,93	14,45	14,65	14,89	14,27	16,12	15,65	16,46	16,62	16,46	14,80267	3,42,04
CICCARIELLO	13,58	13,27	14,21	12,94	15,21	13,96	14,87	14,08	14,99	14,27	15,87	15,67	16,08	16,30	15,88	14,74533	3,41,18
ANASTASIO	13,71	12,78	13,80	12,61	13,18	12,65	13,58	12,80	13,52	13,50	13,64	13,67	14,99	14,02	15,65	13,60667	3,24,10

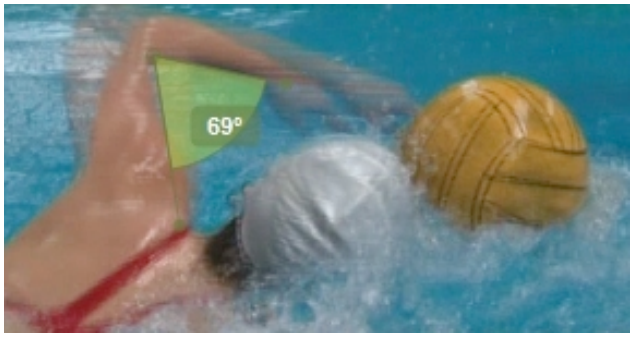


Figure 1. *Angle without ball*

Figure 2*. Angle with ball*

RESULTS

Results can be read in correlation to athletes anamnesis, revealing that incidence of ball-handling is significant only in athletes who have a swimming-oriented athletic history, but there are not significant differences in times for athletes who have a water polo-oriented athletic history.

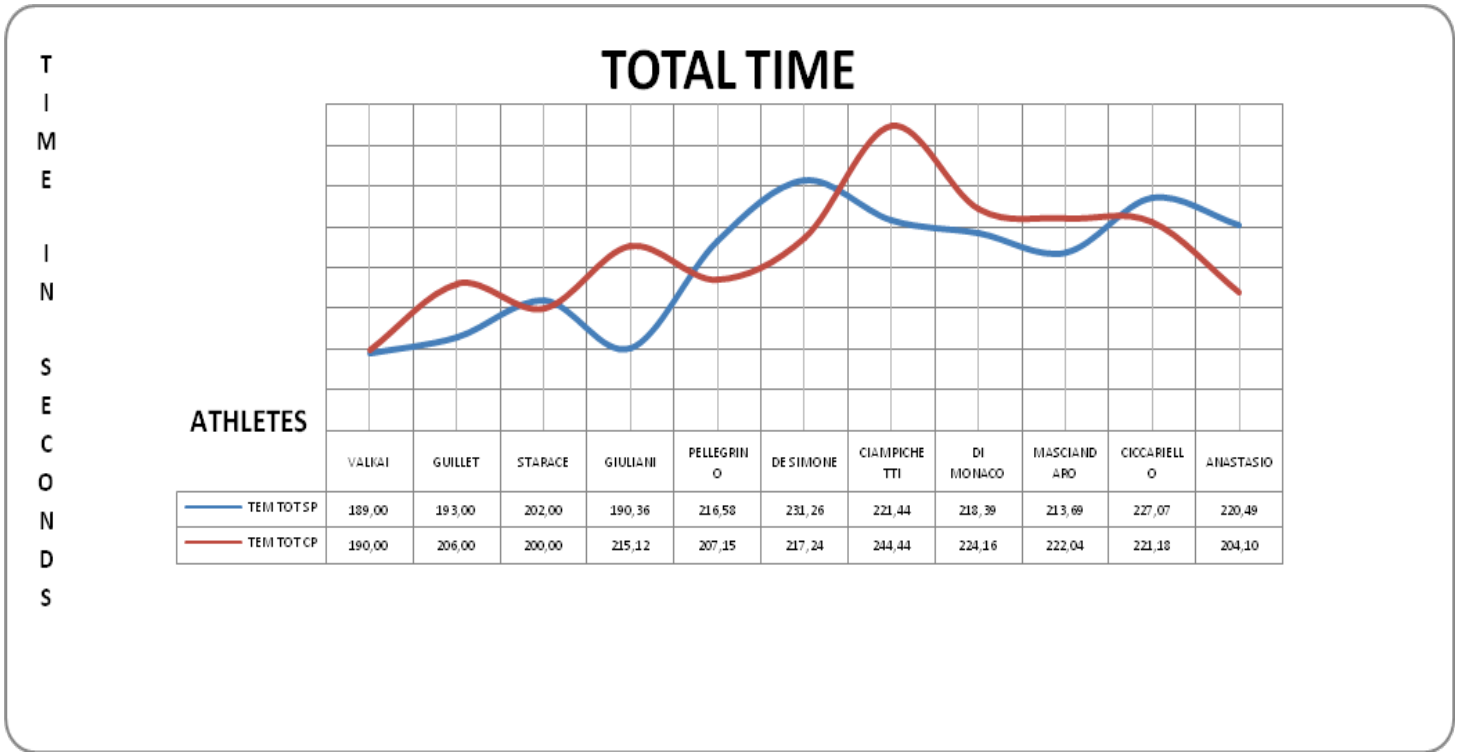
Some water polo athletes realized systematically smaller times when they swam with ball.

For the athletes coming from water polo (Anastasio, Pellegrino), ball-handling affects swimming times in a positive way (results indicate fastest times in the tests carried out with the ball). For the other athletes the results do not show significant changes.

The results show that this study will help the coach to develop a training methodology effective in improving performance. Coaches are suggested to increase the use of ball-handling in all conditions of training.

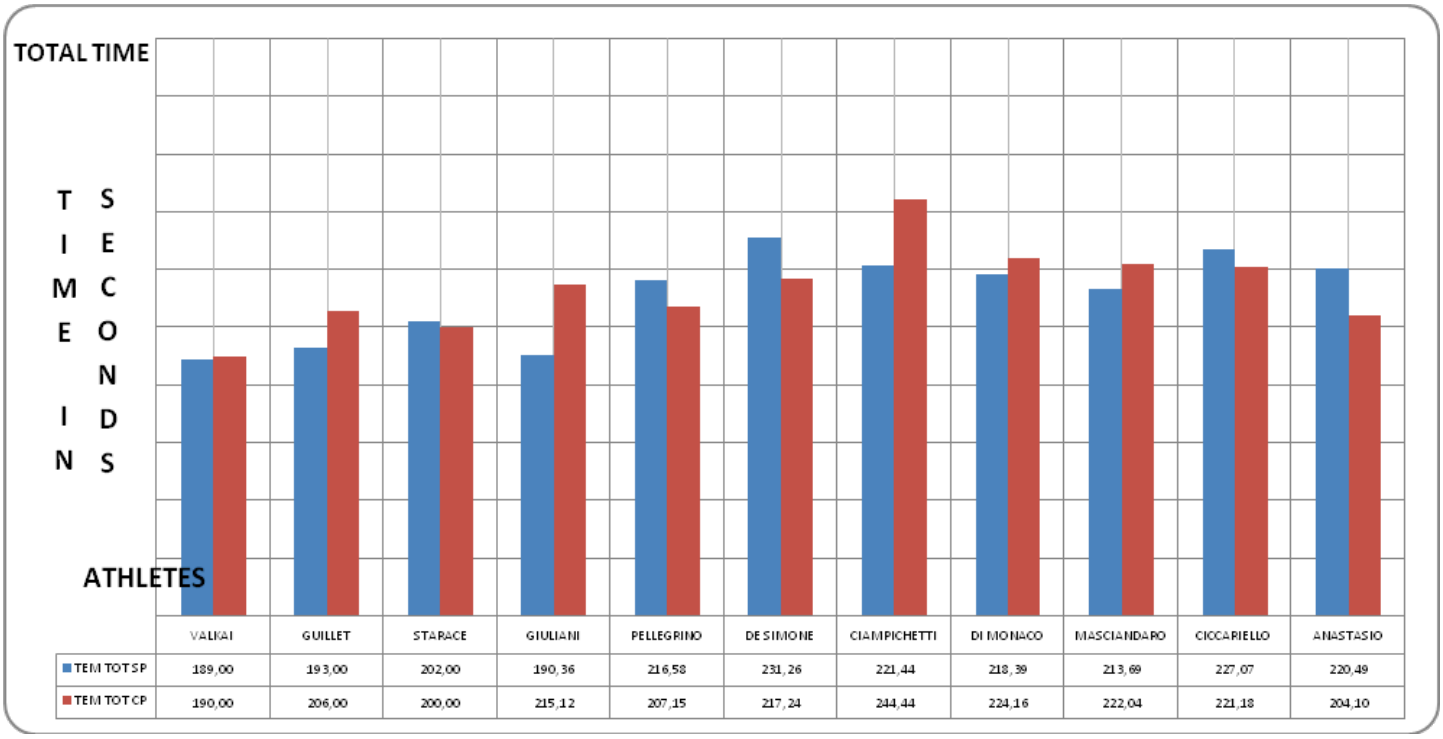
ATHLETES	VALKAI	GUILLET	STARACE	GIULIANI	PELLEGRINO	DESIMONE	CIAMPICHETTI	DI MONACO	MASCIANDARO	CICCARIELLO	ANASTASIO
TEM TOT SP	189,00	193,00	202,00	190,36	216,58	231,26	221,44	218,39	213,69	227,07	220,49
TEM TOT CP	190,00	206,00	200,00	215,12	207,15	217,24	244,44	224,16	222,04	221,18	204,10

Figure 3. *Total time report*



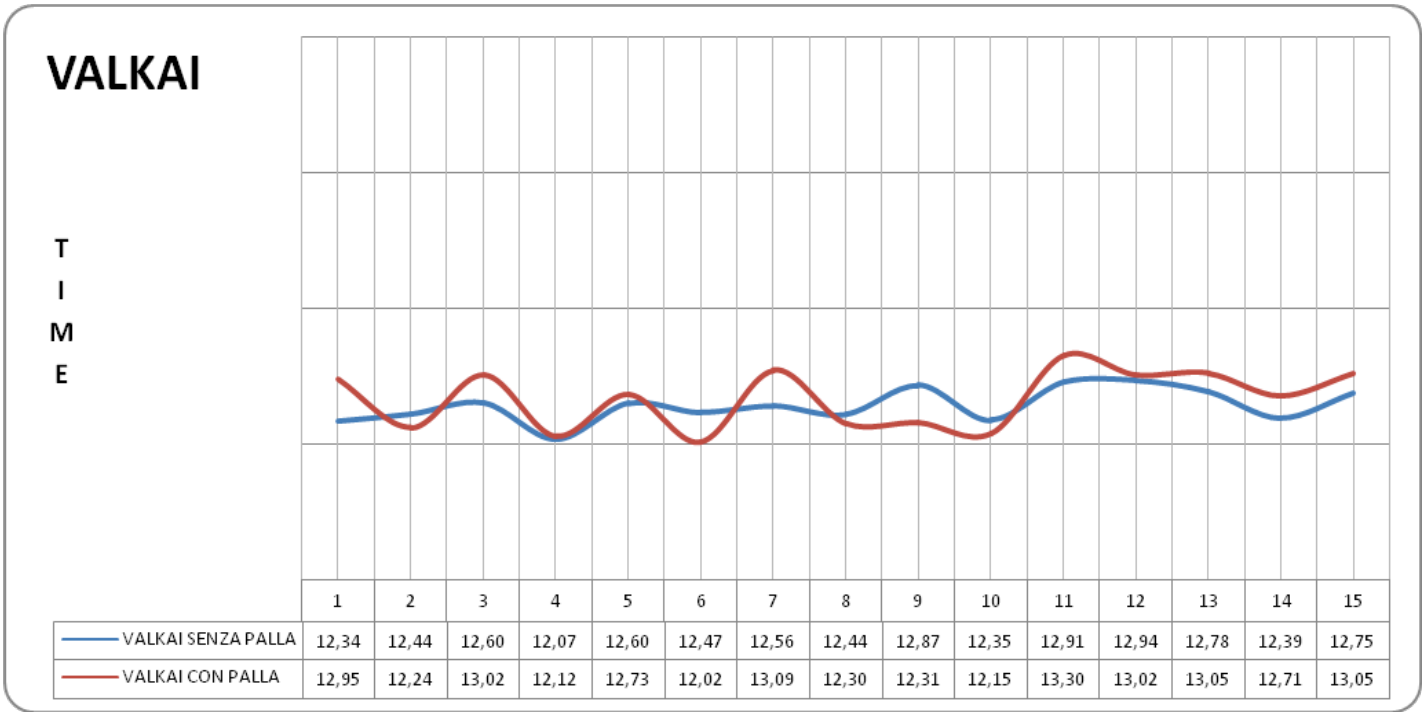
ATHLETES	VALKAI	GUILLET	STARACE	GIULIANI	PELLEGRINO	DESIMONE	CIAMPICHETTI	DI MONACO	MASCIANDARO	CICCARIELLO	ANASTASIO
TEM TOT SP	189,00	193,00	202,00	190,36	216,58	231,26	221,44	218,39	213,69	227,07	220,49
TEM TOT CP	190,00	206,00	200,00	215,12	207,15	217,24	244,44	224,16	222,04	221,18	204,10

Figure 4. *Total time report 1*



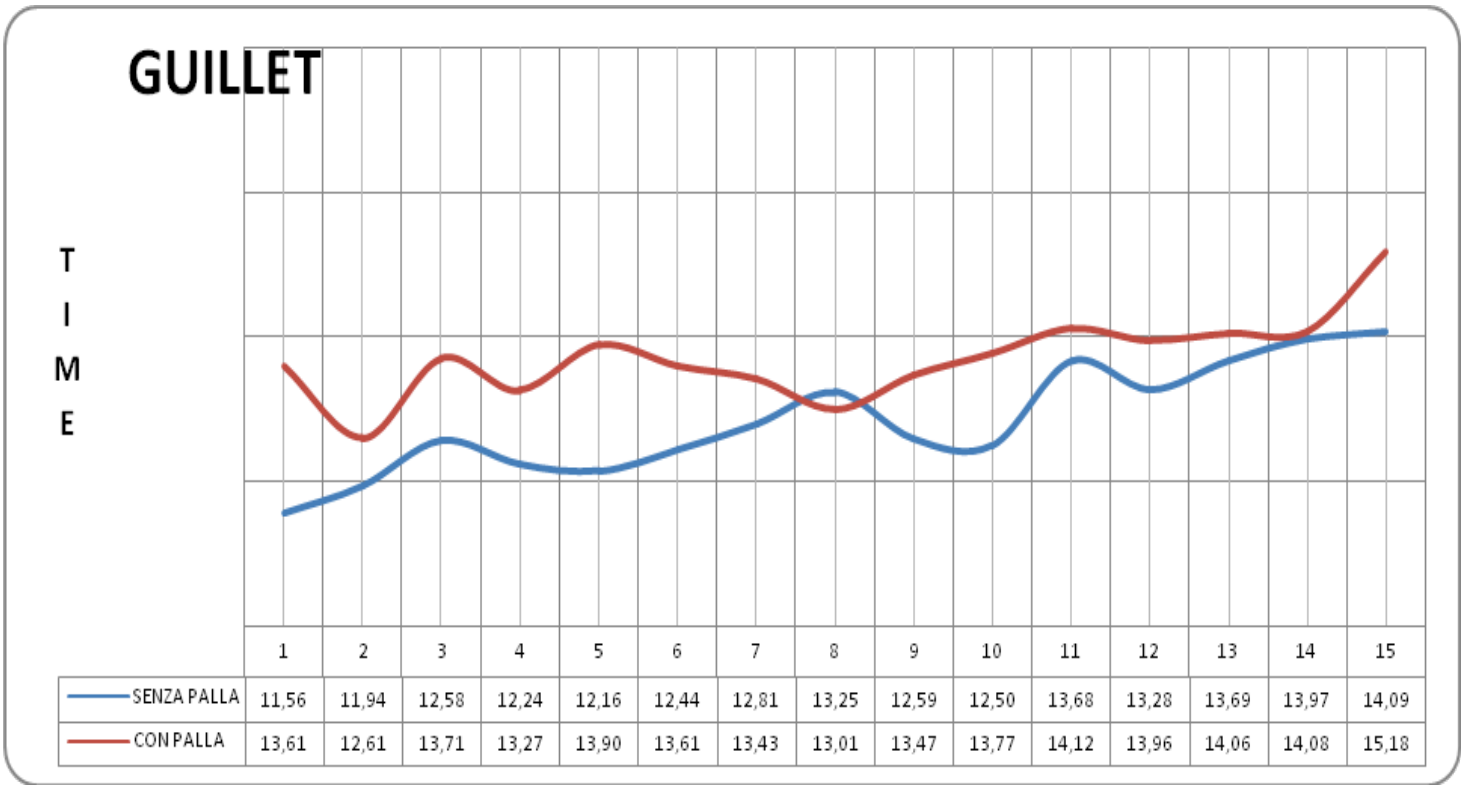
	VALKAI	GUILLET	STARACE	GIULIANI	PELLEGRINO	DE SIMONE	CIAMPICHETTI	DI MONACO	MASCIANDARO	CICCARIELLO	ANASTASIO
TEM TOT SP	189,00	193,00	202,00	190,36	216,58	231,26	221,44	218,39	213,69	227,07	220,49
TEM TOT CP	190,00	206,00	200,00	215,12	207,15	217,24	244,44	224,16	222,04	221,18	204,10

Figure 5. *Total time report 2*



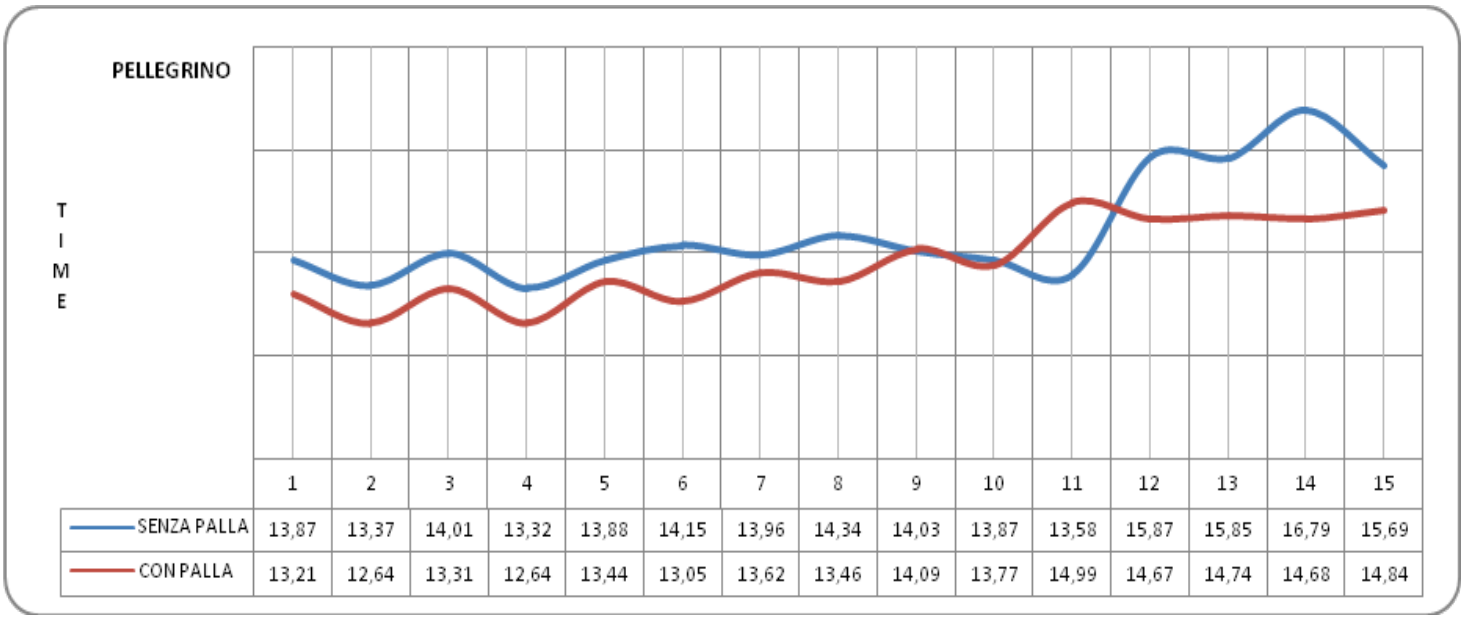
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
VALKAI SENZA PALLA	12,34	12,44	12,60	12,07	12,60	12,47	12,56	12,44	12,87	12,35	12,91	12,94	12,78	12,39	12,75
VALKAI CON PALLA	12,95	12,24	13,02	12,12	12,73	12,02	13,09	12,30	12,31	12,15	13,30	13,02	13,05	12,71	13,05

Figure 6*. Valkai*



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SENZA PALLA	11,56	11,94	12,58	12,24	12,16	12,44	12,81	13,25	12,59	12,50	13,68	13,28	13,69	13,97	14,09
CON PALLA	13,61	12,61	13,71	13,27	13,90	13,61	13,43	13,01	13,47	13,77	14,12	13,96	14,06	14,08	15,18

Figure 7. *Guillet*



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SENZA PALLA	13,87	13,37	14,01	13,32	13,88	14,15	13,96	14,34	14,03	13,87	13,58	15,87	15,85	16,79	15,69
CON PALLA	13,21	12,64	13,31	12,64	13,44	13,05	13,62	13,46	14,09	13,77	14,99	14,67	14,74	14,68	14,84

Figure 8. *Pellegrino*

DISCUSSION

The following tables and graphs show that the average times without ball is not always smaller than those with the ball. This indicates a non mechanical influence of ball handling on swimming intensity.

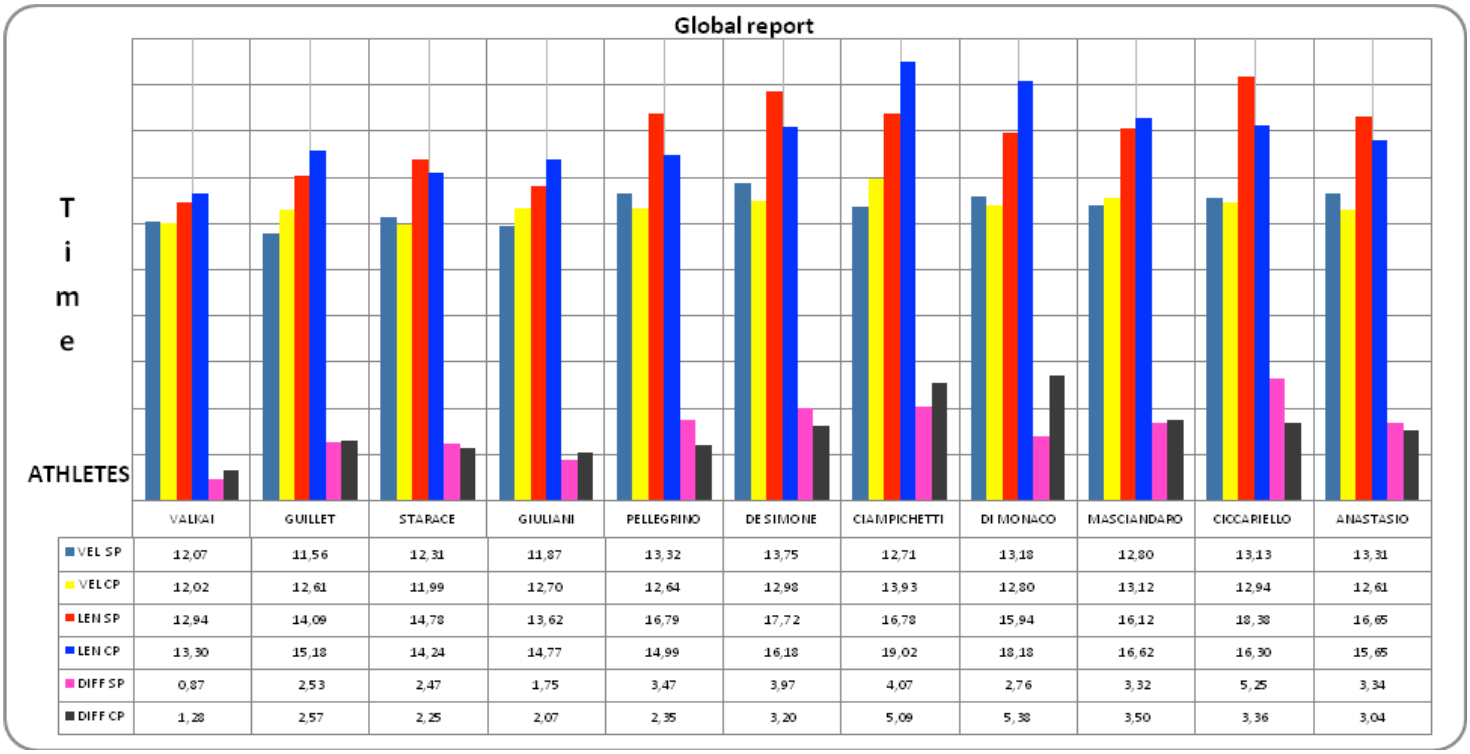
This results can be read in correlation to athletes' anamnesis, revealing that the influence of ball-handling is significant only in athletes who have a swimming-oriented athletic history; but there are no significant differences in times for athletes who have a water polo-oriented athletic history.

Some athletes achieved systematically shorter times when they swam with ball. The results show as this study can help the coach to train the team for improving the analyzed skills in different mode, creating a methodological system training to enhance the performance.

Coaches are suggested to carefully monitor swimming rhythm during trials, and to increment ball-handling in every training condition.

Table 3. *Summary table*

ATHLETE	TOT TIME with ball	TOT TIME Without ball	DIFFERENCE	AVERAGE with ball	AVERAGE without ball	DIFF
VALKAI	189,00	190,00	-1,00	12,57	12,67	-0,10
GUILLET	193,00	206,00	-13,00	12,85	13,72	-0,87
STARACE	202,00	200,00	2,00	13,50	13,30	0,20
GIULIANI	190,36	215,12	-24,76	12,69	13,67	-0,98
PELLEGRINO	216,58	207,15	9,43	14,44	13,81	0,63
DE SIMONE	231,26	217,24	14,02	15,42	14,48	0,94
CIAMPICHETTI	221,44	244,44	-23,00	14,76	16,30	-1,54
DI MONACO	218,39	224,16	-5,77	14,56	14,94	-0,38
MASCIANDARO	213,69	222,04	-8,35	14,25	14,80	-0,55
CICCARIELLO	227,07	221,18	5,89	15,14	14,75	0,39
ANASTASIO	220,49	204,10	16,39	14,70	13,61	1,09



	VALKAI	GUILLET	STARACE	GIULIANI	PELLEGRINO	DE SIMONE	CIAMPICHETTI	DI MONACO	MASCIANDARO	CICCARIELLO	ANASTASIO
VEL SP	12,07	11,56	12,31	11,87	13,32	13,75	12,71	13,18	12,80	13,13	13,31
VEL CP	12,02	12,61	11,99	12,70	12,64	12,98	13,93	12,80	13,12	12,94	12,61
LEN SP	12,94	14,09	14,78	13,62	16,79	17,72	16,78	15,94	16,12	18,38	16,65
LEN CP	13,30	15,18	14,24	14,77	14,99	16,18	19,02	18,18	16,62	16,30	15,65
DIFF SP	0,87	2,53	2,47	1,75	3,47	3,97	4,07	2,76	3,32	5,25	3,34
DIFF CP	1,28	2,57	2,25	2,07	2,35	3,20	5,09	5,38	3,50	3,36	3,04

Figure 9. *Global report.*

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