

Proceeding

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Change in the "goalkeeper wall" adopted for the training of libero in the volleyball

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ABSTRACT

Research revealed that a soccer goalkeeper and a volleyball libero player have multiple characteristics in common. A fundamental motor gesture in both sports is "dig", a movement that requires a certain level of motor skill. The objectives set at the beginning of this experimentation are the improvement of explosive strength and reactivity. The latter specifically given the variability of the trajectories of the ball. 41 athletes divided between goalkeepers and libero players, aged around 15 years who took part in the respective regional sports championships were taken for observation. The "Reach" and "Vertec" tests were used to obtain the elevation data in cm. In addition, innovative tests were introduced which analyse the technical skills based on the role and play ability. Once the incoming data were obtained, the athletes underwent 2 sessions per week for 2 months to train the characteristics in common between the two roles. At the end of the training period, the athletes were again subjected to the tests mentioned above to find potential changes. At the end of the training program, a clear improvement of the whole sample examined emerged.

Keywords: Goalkeeper; Vertec; Reach.

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INTRODUCTION

A current analysis of scientific research, especially in relation to the speed of its evolution, is very important as an initial moment for the determination of the various phases of the project. As you know, science tends to achieve ever-higher goals, aimed at improving human skills. This can be achieved in any field, but in a specific way, in our case, to achieve the set goals. The figure of the libero was born in the late 90s, precisely in 1998, when it was introduced by the FIVB. Entering the analysis of the role and of both motor and cognitive skills, we can see a certain similarity with the role of the goalkeeper in football (Manno et al. 2019). Also in other roles it is important to deep the performance (Izzo et al, 2020ab, Izzo et al, 2019abc) as well as in sport performance globally as part of exercise and sport sciences field (Raiola, 2020, Raiola, Altavilla, 2020, Raiola 2019abc, Raiola et al, 2018, Raiola, D'Isanto 2016ab, Raiola 2015abc, Raiola 2014ab, Raiola 2013, Raiola 2011ab, Parisi, Raiola,2016ab).

A fundamental motor gesture in both sports is "diving", a movement that requires a certain level of motor skill (Paolini et al., 2006). At the same time, the ability to anticipate, on a cognitive level, is vital, since it allows the athlete to sense the direction of the ball (Altavilla 2020, Altavilla, Raiola, 2019, Altavilla et al, 2018, Altavilla, Raiola, 2018, Altavilla et al, 2017, Altavilla, Raiola, 2015, Casolo et al., 2007, D'Elia, Raiola, 2019, D'Elia et al, 2019ab, Invernizzi et al, 2020, 2014ab, 2008). In football, there have been various debates and evolutions of the goalkeeper figure, which have better defined what skills a goalkeeper must have to be able to play at high levels. Nowadays the goalkeeper is an active part of the team's schemes (Fattori et al., 2015, Russo et al, 2019ab). In most cases where the action takes place within the defensive area, the goalkeeper is called to touch the ball several times, to give fluidity to the manoeuvres (Cacciatori et al., 2004). In the volleyball field, the figure of the libero is still being studied to seek a further evolution of the role. Many federations have started research projects and refresher courses, placing the figure of the libero as a central topic. There are various hypotheses about it; for example, the design of a new specific coach course for this role, which aims to train coaches with specific and targeted requirements. Given the fundamental importance of this role, he is required to update himself on the results that science proposes, in a precise and rapid way, on all that the latter can confer as regards the tools he needs in carrying out the figure that he covers.

METHODS AND MATERIALS

Subjects

The sample examined consists of 41 athletes from the year 2004/2005, in particular 22 goalkeepers and 19 libero ones have been selected.

Experimental design

The figure of the libero player, as previously mentioned, is a figure born in the 90s and his training methodology differs from that of the entire team. Within volleyball teams, the average height between the players is around 2m and, usually, the free distance is even 20cm lower than the teammates. This is due to the need to develop certain cognitive and coordinative skills which, starting from certain basic theoretical and practical requirements gradually enrich the player's motor skills, allowing him to perform increasingly complex and optimal performances (Paolini M. et al., 2019). Many technicians have contributed to the continuous evolution of this sports figure through new methodologies and new devices (Urso A. et al., 2020). Going to look in other sports, we realized that some training methodologies could also be used in volleyball (Contadin A. et al., 2019). In this research design, we have chosen a goalkeeper-specific training tool, adapting it to free practice. Through this work and the statistical tool used, it can be demonstrated that the transposition from the goalkeeper to the free one can favour the achievement of the pre-established objectives, which is a

new training methodology that can be administered in volleyball. This can be demonstrated using the "T-test" and the consequent acceptance of the alternative hypothesis that, in this case, is the significance due to the improvement of the subjects trained with this methodology. The testing of the table took place in collaboration with the amateur clubs "ASD Recale 2002", in the football field and the "ASD Volleyball 2000" for volleyball. The aforementioned companies have grouped the sample number indicated by the researchers in order to carry out the project. The companies were provided with a prototype of the board for use in training during the trial period.

The research project started on 09-09-2019 and ended on 8-12-2019.

The athletes were subjected to initial and final tests to allow researchers to establish initial and final parameters.

In particular, the "Reach" and "Vertec" tests were administered for the data relating to the explosive force.

The team of researchers is made up of various job figures according to their skills:

- Engineers and design experts: creation of a table project.
- Teachers and students in sports sciences: explanation and administration of the table.
- Doctors: supervision during the execution of the tests.

The coach positions himself in front of the table while the goalkeeper or libero player stands between the table and the coach. The instructor will launch, for a series of times defining the planning of the administration of the table, the ball against the wall alternating in striking hemispheres of different material that allow the exercise also on short trajectories. This tool allows training with or without an athletic trainer. On a total of 20 repeated throws or throws for 3 series, the athlete must be able to recover as many balls as possible, intercepting the direction of the ball.

RESULTS

Table 1. Anthropometric data.

| ATHLETE | YEAR | ROLE | HEIGHT (cm) | REACH (1) (cm) | VERTEC (1) (cm) | C.T.R. (1) | C.D.G. (1) | REACH (2) (cm) | VERTEC (2) (cm) | C.T.R. (2) | C.D.G. (2) |
|---------|------|------|----------------|-------------------|--------------------|---------------|---------------|-------------------|--------------------|---------------|---------------|
| 1 | 2005 | L | 1.72 | 2.25 | 2.84 | 3 | 3 | 2.27 | 2.89 | 4 | 4 |
| 2 | 2004 | P | 1.80 | 2.36 | 3.16 | 3 | 3 | 2.38 | 3.19 | 5 | 4 |
| 3 | 2004 | P | 1.98 | 2.60 | 3.21 | 4 | 4 | 2.61 | 3.25 | 5 | 5 |
| 4 | 2005 | L | 1.78 | 2.36 | 2.92 | 3 | 3 | 2.37 | 3 | 4 | 5 |
| 5 | 2005 | L | 1.78 | 2.37 | 3.01 | 4 | 4 | 2.39 | 3.06 | 4 | 5 |
| 6 | 2004 | P | 1.80 | 2.33 | 3.03 | 3 | 3 | 2.35 | 3.07 | 4 | 5 |
| 7 | 2004 | P | 1.82 | 2.30 | 3.15 | 5 | 4 | 2.32 | 3.21 | 5 | 5 |
| 8 | 2004 | P | 1.93 | 2.46 | 3.10 | 4 | 5 | 2.49 | 3.15 | 5 | 5 |
| 9 | 2005 | P | 1.83 | 2.34 | 2.95 | 5 | 5 | 2.36 | 3.02 | 5 | 5 |
| 10 | 2004 | L | 1.74 | 2.21 | 3.01 | 4 | 4 | 2.24 | 3.01 | 4 | 5 |
| 11 | 2005 | L | 1.73 | 2.22 | 2.89 | 4 | 4 | 2.25 | 2.93 | 5 | 5 |
| 12 | 2004 | P | 1.87 | 2.43 | 2.98 | 5 | 5 | 2.47 | 3.04 | 5 | 5 |
| 13 | 2004 | L | 1.72 | 2.24 | 2.93 | 3 | 5 | 2.26 | 2.99 | 5 | 5 |
| 14 | 2004 | P | 1.85 | 2.40 | 2.92 | 5 | 5 | 2.44 | 2.98 | 5 | 5 |
| 15 | 2004 | L | 1.78 | 2.36 | 3.05 | 4 | 5 | 2.37 | 3.11 | 5 | 5 |
| 16 | 2004 | L | 1.71 | 2.18 | 2.91 | 5 | 4 | 2.21 | 2.97 | 5 | 4 |
| 17 | 2004 | P | 1.84 | 2.44 | 2.98 | 5 | 5 | 2.47 | 3.04 | 5 | 5 |
| 18 | 2004 | L | 1.76 | 2.31 | 2.96 | 4 | 5 | 2.33 | 3.02 | 5 | 5 |

| | | | | | | | | | | | |
|----|------|---|------|------|------|---|---|------|------|---|---|
| 19 | 2004 | L | 1.72 | 2.21 | 2.74 | 5 | 5 | 2.24 | 2.81 | 5 | 5 |
| 20 | 2004 | L | 1.79 | 2.34 | 3.05 | 4 | 5 | 2.37 | 3.13 | 5 | 5 |
| 21 | 2005 | P | 1.85 | 2.41 | 3.08 | 3 | 3 | 2.46 | 3.15 | 4 | 4 |
| 22 | 2005 | L | 1.74 | 2.22 | 2.91 | 3 | 3 | 2.29 | 2.96 | 5 | 4 |
| 23 | 2004 | P | 1.81 | 2.36 | 3.06 | 4 | 4 | 2.41 | 3.12 | 5 | 5 |
| 24 | 2004 | P | 1.73 | 2.25 | 2.94 | 3 | 3 | 2.31 | 2.99 | 4 | 5 |
| 25 | 2005 | P | 1.90 | 2.46 | 3.9 | 4 | 4 | 2.5 | 3.14 | 4 | 5 |
| 26 | 2005 | P | 1.86 | 2.43 | 2.97 | 3 | 3 | 2.5 | 3.01 | 4 | 5 |
| 27 | 2004 | L | 1.70 | 2.19 | 2.92 | 5 | 4 | 2.24 | 2.97 | 5 | 5 |
| 28 | 2005 | P | 1.82 | 2.3 | 3.13 | 4 | 5 | 2.36 | 3.2 | 5 | 5 |
| 29 | 2004 | L | 1.78 | 2.29 | 3.1 | 5 | 5 | 2.35 | 3.6 | 5 | 5 |
| 30 | 2005 | L | 1.77 | 2.28 | 2.93 | 4 | 4 | 2.34 | 2.97 | 4 | 5 |
| 31 | 2005 | P | 1.83 | 2.33 | 3.03 | 4 | 4 | 2.4 | 3.1 | 5 | 5 |
| 32 | 2005 | P | 1.86 | 2.38 | 3.01 | 5 | 5 | 2.44 | 3.19 | 5 | 5 |
| 33 | 2004 | P | 1.87 | 2.4 | 2.91 | 3 | 5 | 2.48 | 2.96 | 5 | 5 |
| 34 | 2005 | L | 1.80 | 2.31 | 2.95 | 5 | 5 | 2.37 | 3 | 5 | 5 |
| 35 | 2004 | P | 1.85 | 2.38 | 2.94 | 4 | 5 | 2.44 | 2.99 | 5 | 5 |
| 36 | 2005 | L | 1.77 | 2.27 | 2.92 | 5 | 4 | 2.33 | 2.98 | 5 | 4 |
| 37 | 2004 | P | 1.84 | 2.34 | 2.95 | 5 | 5 | 2.41 | 3.1 | 5 | 5 |
| 38 | 2005 | P | 1.85 | 2.36 | 3.04 | 4 | 5 | 2.41 | 3.1 | 5 | 5 |
| 39 | 2004 | L | 1.77 | 2.28 | 2.93 | 5 | 5 | 2.35 | 2.99 | 5 | 5 |
| 40 | 2005 | L | 1.68 | 2.18 | 2.9 | 4 | 5 | 2.24 | 3.5 | 5 | 5 |
| 41 | 2005 | P | 1.83 | 2.33 | 2.98 | 4 | 4 | 2.39 | 3.3 | 5 | 4 |

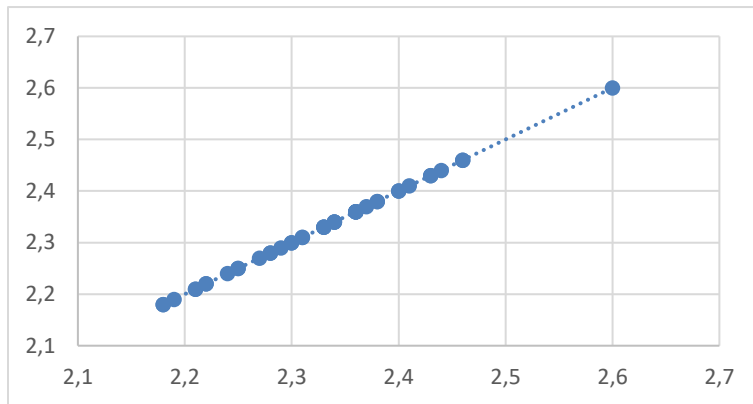


Figure 1. Scatter chart Reach test.

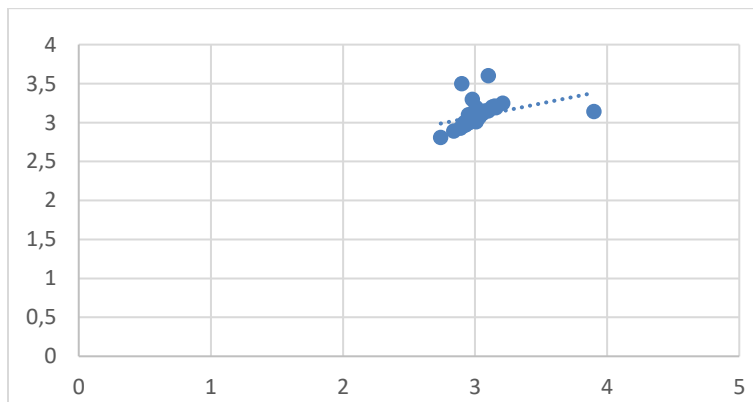


Figure 2: Scatter chart Vertec test.

Table 4. T-test play ability.

| | Variable 1 | Variable 2 |
|---------------------------------------|--------------|-------------|
| Media | 4.3 | 4.85 |
| Variance | 0.625641026 | 0.130769231 |
| Observation | 40 | 40 |
| Total variance | 0.378205128 | |
| Difference hypothesized for the media | 0 | |
| DoF | 78 | |
| Stat t | -3.999576249 | |
| p(T<=t) one tail | 7.16079E-05 | |
| t critical one tail | 1.664624645 | |
| p(T<=t) two tail | 0.000143216 | |
| t critical two tail | 1.990847069 | |

Table 5. T-test technical skills by role.

| | Variable 1 | Variable 2 |
|---------------------------------------|--------------|-------------|
| Media | 4.097560976 | 4.756097561 |
| Variance | 0.590243902 | 0.18902439 |
| Observation | 41 | 41 |
| Total variance | 0.389634146 | |
| Difference hypothesized for the media | 0 | |
| DoF | 80 | |
| Stat t | -4.776704032 | |
| p(T<=t) one tail | 3.97178E-06 | |
| t critical one tail | 1.664124579 | |
| p(T<=t) two tail | 7.94356E-06 | |
| t critical two tail | 1.990063421 | |

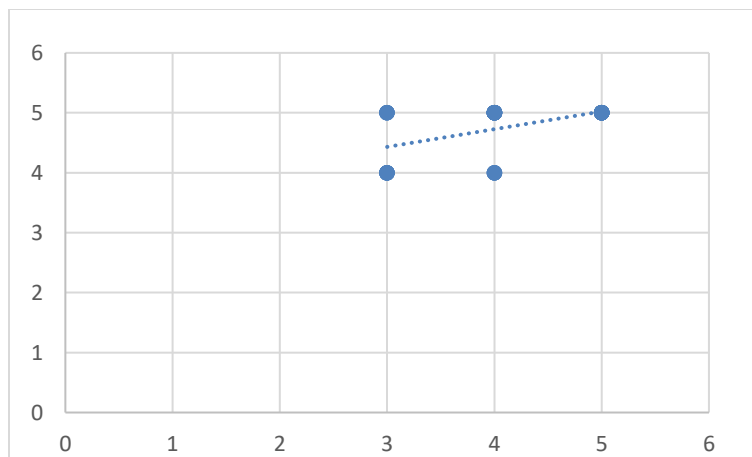


Figure 3: Scatter chart technical skills by role.

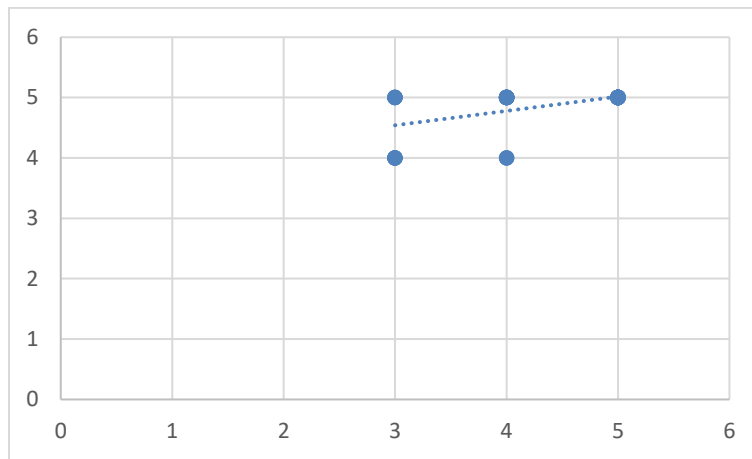


Figure 4. Scatter chart play ability.

Table 4. T-test play ability.

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|---------------------------------------|--------------|-------------|
| Media | 4.3 | 4.85 |
| Variance | 0.625641026 | 0.130769231 |
| Observation | 40 | 40 |
| Total variance | 0.378205128 | |
| Difference hypothesized for the media | 0 | |
| DoF | 78 | |
| Stat t | -3.999576249 | |
| p(T<=t) one tail | 7.16079E-05 | |
| t critical one tail | 1.664624645 | |
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| DoF | 80 | |
| Stat t | -4.776704032 | |
| p(T<=t) one tail | 3.97178E-06 | |
| t critical one tail | 1.664124579 | |
| p(T<=t) two tail | 7.94356E-06 | |
| t critical two tail | 1.990063421 | |

DISCUSSION

In Table 1, the incoming and outgoing data have been reported, respectively marked by the numbers 1 and 2, obtained with the following tests:

- Reach test: it is the height value reached with the arm stretched up, keeping the feet on the ground.
- Vertec test: it is the height value reached after jumping simulating the technical gesture of the dunk.
- C.T.R: Technical skills based on the role; score attributed by an evaluation of the fundamentals acquired by the athlete based on the role during specific training following the pre-established guidelines on the attribution of the score, using the variation of the "goalkeeper wall" by establishing the following parameters:
 - 2: player with bad technical skills based on the role. From 0 to 5 balls recovered.
 - 3: player with normal technical skills based on the role. From 5 to 10 balls recovered.
 - 4: player with good technical skills based on the role. From 10 to 15 balls recovered.
 - 5: player with excellent technical skills based on the role. From 15 to 20 balls recovered.
- C.D.G: Game Skill: score attributed with a game evaluation of the player in certain game schemes following the guidelines on the attribution of the score:
 - 2: player with poor game skills.
 - 3: player with normal game skills
 - 4: player with good game skills
 - 5: player with excellent game skills

In these scatter plots (Figures 2; 3) the values obtained from the Reach and Vertec tests have been reported both inbound and outbound. Looking at the line of linear regression, there is an improvement in the output results compared to the initial results of almost all athletes. This type of test-t (Tables 2,3), with dependent samples assuming various variances, is used to evaluate improvements or worsening of the same group, placing a null hypothesis and an alternative hypothesis.

Null hypothesis: possible improvements but not due to the training methodology. They can be attributed either to chance or to a variable that has not been taken into consideration.

Alternative hypothesis: possible improvements due to the training methodology used.

In order that the alternative hypothesis to be accepted, the "two-tailed $p (T \leq t)$ " is less than .05, obtaining an error margin of 5%. If the value obtained falls within the 5% error margin, the alternative hypothesis is accepted. Therefore, the value of the "two-tailed $p (T \leq t)$ " shown in the previous tables is within the predetermined margin of error; for this reason, the alternative hypothesis is accepted and the training methodology performed is effective. The data obtained from the tests to evaluate the technical skills based on the role and the game skills, were also analysed through scatter charts and the T-test. Also, in their respective scatter plots (Figures 4,5) we note the upward trend of the line of the linear regression. This shows an improvement in these skills.

Analysing the T-test fees (Tables 4,5), it shows that the value of the " $p (T \leq t)$ two-tailed" is less than .05 therefore it falls within the predetermined margin of error.

CONCLUSION

The project, structured in two parts through the analysis of the goalkeeper's role in football and the role of the libero player in volleyball, reaches particularly interesting and concrete conclusions in the second part. Inside it, conducted on an entirely experimental basis, the data collected from the tests carried out are reported.

The work provides constructive alternatives and valid tools for training, especially in view of the further future developments that lie ahead. The analysis of the responses to the stimulus administered was very useful. This is above all because, by making contractions appropriate to the situations, it was possible to reflect on the fact that the reaction times depend on the greatest possible number of stimulus-response alternatives. It is precisely the variation of the stimulus that provokes increasingly effective reactions, also considering that the effectiveness of the performance is closely related to the speed to take lightning, adequate and correct decisions.

From the data obtained, the researchers found an improvement in coordination skills; in particular some athletes have developed explosive strength in greater ways by improving the final test result by several centimetres.

Having obtained feedback in both sports, this board can be defined as a "multipurpose or bifunctional board" given its effectiveness in both sports.

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