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Analysis of agility and coordination training programs effects on football skills based on comparative experiments

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ABSTRACT

Chinese national football team has performed poorly in previous three decades and descended to a trash Asian football team in recent years. With the target of the current situation of China's football teams and at an attempt to promote Chinese players' football skills, this research studies agility and coordination training programs' affects on players' ability to control the ball by conducting comparative experiments. 40 amateur student players were selected to finish the experiments. It came to the conclusion that these training programs will improve players' ability in taking control of the ball, running with the ball, controlling ball-dropping marks and agility. Therefore, in the future football training, coaches should attach importance to players' agility and coordination, strengthen young players' agility and coordination and use scientific training methods.

KEYWORDS

Comparative experiments; Agility and coordination; Football skills.

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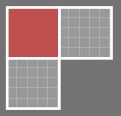

INTRODUCTION

Football, a world famous sport, has its origin in ancient China. Cuju (the earliest form of football) existed as early as Spring and Autumn Period and Warring States Period in China. However, no tremendous accomplishments happened to Chinese football in previous three decades and the situation even got worse. Chinese national football team is by no means good enough to compete with world first-class teams and is even worse than other Asian teams, such as Japanese and Korean national football teams. It has descended to a trash Asian team. Many sports professionals are dedicated to finding out why Chinese national football team has such a poor performance. Gu Shanguang and Tao Yu (2007)[1] and Gu Shanguang (2008)[2] pointed out that the fundamental cause of poor performance is the imperfection of the system. Zhou Chi, Gong bo, Dong Zhongming and Yan Zhongjie (2012)[4] thought the improvement of Chinese football relies on system innovation and vocational reform.

The football training programs include physical constitution, strategy, mental attitude, ect. The conventional physical training usually focuses on speed, strength and endurance. But the training on players' agility and coordination is also important. Agility and coordination are the combination of strength, endurance, speed and flexibility and have direct effects on players' skills and performance on the field. Therefore, by conducting comparative experiments, the research discovered that the training on players' agility and coordination has crucial effects on improving football skills.

DATA AND METHODS

General data

(1) Target samples: 40 2013-grade amateur student players from our university's school of physical education were selected. They all received some football training but are no professionals, at the age from 18 to 23, with the height from 167.3 cm to 185.7 cm, the weight from 68 kg to 79kg and the experience of football from 2 to 4 years. (2) Grouping: The 40 players were randomly divided into 2 groups. The 20 players in the experimental group received conventional training programs, and agility and coordination training programs. While the 20 players in the control group received only conventional training programs. (3) In the experimental group: the players are at the age from 19 to 22 and the average age is 21.4. Their height is from 167.3 cm to 182.8 cm and the average height is 173.6 cm. Their weight is from 68 kg to 76 kg and the average weight is 72.1 kg. Their experience of football is from 2 to 4 years and the average time is 2.1 years. All of the factors are shown in the TABLE 1. (4) Iin the control group: the players are at the age from 18 to 22 and the average age is 21.3. Their height is from 168.1 cm to 185.7 cm and the average height is 174.8 cm. Their weight is from 68 kg to 79 kg and the average weight is 73.0 kg. Their experience of football is from 2 to 4 years and the average time is 2.2 years. All of the factors are shown in the TABLE 1. (5) The age, height, weight and experience of football of the two groups don't have obvious differences in the perspective of statistics ($P > 0.05$) and are legitimate for comparison and analysis.

TABLE 1 : The general data of player samples

Groups	Numbers (unit)	Average age (age)	Average height (cm)	Average weight(kg)	Average years of football experience(age)
Experimental group	20	21.4	173.6	72.1	2.1
Control group	20	21.3	174.8	73	2.2
P	>0.05	>0.05	>0.05	>0.05	>0.05

Experimental methods

The 40 student players took 4 football classes every week, with 45 minutes every class. The semester had 18 weeks, 54 classes in total. The experiment was conducted throughout the whole semester.

With the major training programs unchanged, the student players in the experimental group took extra 20-minute agility and coordination training programs during the warming-up, including body-turning, fast getting-off, football rhythm gymnastics, close-marking defense and breaking loose and jumping. All these training programs were arranged to improve players' agility and coordination.

With the major training programs also unchanged, while the experimental group was working on the improvement of agility and coordination, the student players in the control group only took conventional warming-up exercises, including jogging, speed agility run and joint and muscle stretching exercises. The effects of different exercises are shown in the TABLE 2.

TABLE 2 : The effects of different warming-up exercises

Effects	Warming-up exercise
Getting warm	Jogging, speed agility run
Joint and muscle stretching	Stretching all joints, ligament and muscles
Improving agility	Body-turning, fast getting-off, close-marking defense and breaking-loose
Improving coordination	football rhythm gymnastics, jumping exercise combining all body parts

Observing index

The data of 2 groups' football skills both before and after the experiment were recorded respectively. The evaluation subjects include juggling the ball with feet, dribbling the ball to pass poles for 15 meters, shooting from 25 meters away and shuttle run. The evaluation methods of all subjects are shown in TABLE 3. The experimental group and the control group both shared the same field, evaluation team and evaluation standards. Therefore, the scores of different football skills were fairly obtained and legitimate for comparison and analysis.

TABLE 3 : The evaluation methods of different football skills

Evaluation subjects	Evaluation methods	scores
juggling the ball with feet	1. Players are allowed to juggle the ball with any part of their feet. When the ball hit the ground, the juggling is over. 2. Juggling the ball with other body parts other than feet or just with one foot does not count. 3. Every player takes two rounds and the better one will be recorded.	The numbers of nonstop juggling the ball with both feet
dribbling the ball to pass poles for 15 meters	1. Place 6 poles at equal distance along the track for 15 meters, with each pole no shorter than 1.5 meters. 2. The player starts from the starting point, dribbles the ball to pass all the poles and reaches at the finish line with the ball. If one pole is missed during the dribbling, 1 second will be added to the result. If two are missed, the result will be taken as invalid. 3. Every player takes two rounds and the better one will be recorded.	Time begins when the player's foot reaches the ball and ends when the player arrives at the finish line with the ball. The time will be converted to scores.
shooting from 25 meters away	1. Take O as the centre of a circle and place a 1-meter high flag at O as the marker for ball-passing. Also take O as the centre of a circle and draw 3 concentric circles with the radius of 2 meters, 3 meters and 4 meters respectively. The 3 concentric circles are used to measure the distance. And draw a 6-meter arc with the radius of 25 meters, used as the service line. 2. The player places the ball at the service line and kicks the ball into the circles. The kick is valid if the ball drops within or on the circles. 3. Every player has 10 kicks and the total of 10 kicks will be recorded.	10 points will be obtained when the ball hits the circle with the radius of 2 meters; 8 points when the ball hits the 3 maters; 6 points when ball hits the 4 meters. The total points of 10 kicks make up the final result.
shuttle run	1. Set the starting point and the finish line along the 25-meter track. The player runs from the starting point to the finish line and touches the ground then runs back to the starting point, for 4 times. 2. 1 second will be added to the final result if the player doesn't touch the ground as required. 3. Every player takes 1 round and the result will be recorded.	Time begins when the player runs from the starting point and ends until the player finally runs back to it. The time will be converted to scores.

The statistical method

All the data in this research was analyzed with SPSS 13.0 data packet. The numbers were measured by mean standard deviation (±s). The results of 2 groups were measured by t and the difference of $P < 0.05$ is valid in statistics.

FINAL RESULTS

The comparison of 2 groups' ability to control the ball after the experiment

The players' ability to control the ball was evaluated by the subject of juggling the ball with feet before and after the experiment. The data is shown at TABLE 4.

TABLE 4 : The comparison of 2 groups' scores of juggling the ball with feet (±s)

Groups	N	Scores of juggling the ball with feet
experimental group	20	77.53 ± 8.32
control group	20	72.41 ± 7.33
t	\	2.14
P	\	< 0.05

TABLE 4 shows that the score of juggling the ball with feet of the experimental group is (77.53 ± 8.32) after the experiment and the score of the control group is (72.41 ± 7.33). It can be concluded that the players from the experimental group are better at controlling the ball and $P < 0.05$, which is valid in statistics.

The comparison of 2 groups' ability to run with the ball

The players' ability to run with the ball was evaluated by the subject of dribbling the ball to pass poles for 15 meters before and after the experiment. The data is shown at TABLE 5.

TABLE 5 : The comparison of 2 groups' scores of dribbling the ball to pass poles for 15 meters (±s)

Groups	N	Scores of dribbling the ball to pass poles for 15 meters
experimental group	20	77.62 ± 5.48
control group	20	72.45 ± 5.97
t	\	4.73
P	\	＜0.01

TABLE 5 shows that the score of dribbling the ball to pass poles for 15 meters of the experimental group is (77.62 ± 5.48) after the experiment and the score of the control group is (72.45 ± 5.97). It can be concluded that the players from the experimental group are better at running with the ball and $P < 0.01$, which is valid in statistics and the difference is huge.

The comparison of 2 groups' accuracy of ball-dropping

The accuracy of ball-dropping of 2 groups after the experiment was evaluated by the subject of shooting from 25 meters away. The data is shown at TABLE 6.

TABLE 6 : The comparison of 2 groups' scores of shooting from 25 meters away (±s)

Groups	N	Scores of shooting from 25 meters away
experimental group	20	79.43 ± 6.91
control group	20	69.98 ± 7.83
t	\	2.45
P	\	＜0.05

TABLE 6 shows that the score of shooting from 25 meters away of the experimental group is (79.43 ± 6.91) after the experiment and the score of the control group is (69.98 ± 7.83). It can be concluded that the accuracy of ball-dropping of the players from the experimental group is better than the control group and $P < 0.01$, which is valid in statistics.

The comparison of 2 groups' agility

The agility of the 2 groups after the experiment was evaluated by the subject of shuttle run. The data is shown at TABLE 7.

TABLE 7 : The comparison of 2 groups' score of shuttle run (±s)

Groups	N	Score of shuttle run
experimental group	20	76.21 ± 4.98
control group	20	71.03 ± 6.90
t	\	3.22
P	\	＜0.05

TABLE 7 shows that the score of shuttle run of the experimental group is ((76.21 ± 4.98) after the experiment and the score of the control group is (71.03 ± 6.90). It can be concluded that the players from the experimental group are more agile than the control group and $P < 0.05$, which is valid in statistics.

The 4 groups of data from the experiment indicate that the training programs of agility and coordination can improve players' football skills, specially the ability of running with the ball.

THE EVALUATIONS OF THE EXPERIMENT

Training on agility and coordination can improve football skills

Players' agility and coordination are partly genetically determined, which have large effects on players' skills and performance. The numbers of a player's certain skills and movements used on the field are usually determined by the

physiological process. They are unconscious reactions controlled by the nervous system, which is determined by the genetic inheritance and cannot be significantly changed by training. However, the training programs on agility and coordination can improve the precision of certain skills and movements and enable players to finish the skills on certain occasions, which will lead to better performance on the field.

Therefore, the training on agility and coordination of players should be strengthened in football training and should be made equally important as the training of strength, endurance and speed. Besides, a large amount of evidence demonstrates adolescence is the formative period for football training. So it's necessary to arrange agility and coordination training programs for young players so as to lay the solid foundations [5].

The scientific methods of agility and coordination training

A player's agility includes the ability of decision-making, changing movements and fast changing directions. They are influenced by the flexibility of cerebral cortex, powers of observation and processing capability and physical constitution. The flexibility of cerebral cortex refers to the ability of changing excitability into inhibition and vice versa. So the training program on agility should be arranged on the early part of the training, when the players are energetic and the excitability of cerebral cortex is high [7]. A player's physical constitution refers to his strength, speed and endurance. And the improvement of a player's agility is a process of comprehensive improvement and the training should be diverse. Besides, the agility is made of several separate parts. If the player is better at all skills and movements, his agility will be significantly improved.

Football players use different moves and run with different speeds, in different distance and to different directions. Some of which are used for certain moves, such as catching the ball, taking control of the ball, passing the ball and shooting. Others are used for breaking loose and taking the best spot. Those moves in the field are all spontaneous according to the situation and their bodies don't show certain regularities. Whether these moves can be finished preciously, accurately and with the minimum efforts reflects the coordination of the player. Huang Chuanbing and Pan Taitao pointed out that to improve of players' coordination should improve their balance, body perception, visual perception, auditory perception and the ability to control their legs[8].

CONCLUSION

By conducting a comparative experiment among 40 amateur student players from the school of physical education in our university, this research concluded that the players received agility and coordination training are better at taking control of the ball, running with the ball and dropping the ball at certain spot and more agile than players received only conventional training programs. Therefore, coaches should focus on the training on agility and coordination in football training and pay special attention to the agility and coordination of young players. Last but not the least, the training on agility and coordination should take scientific methods.

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