

The Impact of Muscle Strengthening Based on Intermittent Strength Exercises on the Improvement of Performance Factors of Soccer Player

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Abstract:

The objective of this study is to know the effect of the intermittent force method on the improvement of different factors of the performance the maximum aerobic speed "MAS", and the strength power in U21 footballers.

30 U21 amateur players participated in the study. They were divided into 2 groups each containing 15 players. The subjects carried out the YO-YO test to measure the "MAS" and extrapolate the VO₂max, and the 5jump test to evaluate the strength power, the Results show that The exercises intermittent strength has a significant impact on the development of the MAS, and strength power.

Keywords: intermittent strength. factors of the performance. U21 players.

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1. Introduction

Football is an activity that is multifactorial, meaning that a player's performance depends on the interaction of his technical, tactical, physical and mental abilities. each playing position presents

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specificities which vary according to the requirements and the technical-tactical orientations (defensive and offensive animation) driven by the technical staff as many very high level techniques say, physical preparation holds an important place in football modern whether integrated, dissociated or associated (dellal, 2010)

The analysis of the activity during a football match carried out using different modern tools shows that the activity of the high-level footballer has evolved well; in 1952, the players covered a total distance of 3361m while that nowadays, these values are between 10425m to 11780m (Dellal et al, 2011), corresponding to average heart rate values located between 80 and 90% of the max HR (Stolon et al, 2005).

On the other hand, Speed Force constitutes a main and decisive element in defensive and offensive actions, which presents the capacity of the neuromuscular system to overcome resistance with the greatest possible contraction speed, this very important Quality in football since it combines the strength with speed and Allows you to perform jumps, strikes, fall and reintegration, and to perform short sprints, change of direction, braking. (Weineck, 1996).

Bangesbo (1994 a and 994 b) and Verheijen (1997) analyzed and described the activity of the footballer as a so-called “intermittent” activity, because during a match, the player performs different actions (dribbling, sprinting, various runs, etc.).) at intensities which vary randomly and which differ depending on the position, the level of play, the experience and the role played within the team. So many authors have been interested in these types of exercises, there are many benefits to this type of exercise.

According to G, Cometti, intermittent work can present itself in different forms, one of these forms is intermittent force.

If we refer to the delivery model in football, a training method must provide for brief max efforts during which we will have a significant intervention of the anaerobic alactic mechanism and a fundamental intervention of type II fibers, such max efforts should be and repeated intermittently.

Based on these data and from various studies, such as that of “Cometti, 2010” which shows that intermittent force considers a fundamental average for the development of aerobic qualities. Our study came to know the impact of this method on the improvement of performance factors “endurance, strength power” in footballers.

2. Objective of the study:

The objective of the study is to know the impact of the intermittent force method on the performance factors “endurance, strength, speed” in U21 football players.

3. Materials and methods:

30 senior category players participated in the study. They were divided into 2 groups each containing 15 players. The subjects performed the Yo-Yo test to measure the “MAS” and extrapolate the VO₂max and the 5 jump test to measure the force speed, and the following table shows the properties of the research sample.

Table n : 01 shows the morphological characteristics of the study samples.

	lenthg (cm)	weight (kg)	Age (years)
Experimentalsample	185.17	71.25	20
Control sample	186.91	72.33	20

4. **Presentation of the results:** after applying the tests on the samples, we obtain the results shown in the following tables:

Table n : 02 shows the experimental sample results.

	Pre-test		Post-test	
	X	S	X	S
Maximum aerobic speed	13	1.21	15	1.13
Strentgh power	11.50	1.46	13.93	1.28

X : mean.

S :standard deviation

Table n: 03 shows the control sample results.

	Pre-test		Post-test	
	X	S	X	S
Maximum aerobic speed	13	1	13.5	1.25
Strentghpower	11.24	1.84	11.52	1.61

X : mean.

S :standard deviation

Table n:(04) shows the post-test comparison results of the study samples

Study parameters	The mean		Value of « T » test	Value of « T » table	The meaning of the results
	Control sample	Expérimental sample			
	X	X			
Maximum aerobic speed	13.5	15	3.17	1.74	significal
strength power	11.52	13.93	4.26	2.65	significal
Degree of freedom= 28		Sig = 0.05		X: the mean	

5. Discussion:

The majority of studies in the field of intermittent exercise have analyzed acute physiological and physical responses (Clemente et al., 2014a; Halouani et al., 2014b; Hill-Haas et al., 2011). However, effects after training programs appear to be more important in identifying the value of this approach for team sports training.

The three studies carried out in different team sports (football, futsal and rugby) revealed the tendency of training programs based on intermittent exercises to improve the aerobic systems of players and their ability to repeat sprints (Berdejo-del- Fresno et al., 2015; Owen et al. 2012; Seitz et al., 2014).

A study of elite soccer players (Dellal et al., 2008) found that HR responses were significantly higher during 30-30 with active recovery, than during reduced one-on-one, four-on-one games. against four, eight against eight and ten against ten.

In addition, intermittent exercises would make it possible to delay the onset of fatigue and to recover more quickly between sessions (Balsom, 1995), a possible increase in the buffering capacities of the muscle (Böning et al, 2007), a solicitation of all the fibers with a use of PCr in parallel with a use of O₂ of myoglobins and hemoglobins (Bhambhani, 2004), a lesser use of anaerobic glycolysis, therefore an economy of glycogen stocks and a less significant accumulation

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of lactate (Gaitanos et al., 1993), the use of intermittent exercises of short duration such as 5-20, 10-10 and 15-15, would help develop the anaerobic capacity of athletes (Billat, 1998).

The effects of intermittent exercise have been analyzed in football, handball and basketball. In the majority of studies, there are significant statistical differences found between the pre and post test in aerobic/anaerobic systems and physical capacities (Buchheit et al., 2009b; Delextrat and Martínez 2014; Impellizzeri et al., 2006).

In case of pre and post intervention (6–12 weeks), it was found that intermittent exercise produces significant improvements in aerobic responses measured by VO₂max (7 to 8% better) (Impellizzeri et al., 2006a; Radziminski et al., 2013; Reilly and White, 2004), VO₂ at lactate threshold (8 to 13% better) (Impellizzeri et al., 2006a; Radziminski et al., 2013) and 30-15 IFT (3 to 6 % better) (Buchheit et al. 2009b; Delextrat and Martínez 2014). In the case of speed, both training programs revealed statistical improvements in the 5m sprint (2-3% faster) (Radziminski et al. 2013), 10m sprint (1-4% faster) rapid) (Buchheit et al., 2009b; Iacono et al. 2015), 20 m sprint (2–4% faster) (Iacono et al., 2015) and agility (1–2% faster) (Iacono et al., 2015).). Finally, the effects of training programs on countermovement jumps (3-10% better) (Arcos et al. 2015; Buchheit et al., 2009b; Iacono et al., 2015), peak power (4 to 5% better) (Jastrzebski et al., 2014; Radziminski et al., 2013), total work capacity (4 to 5% better) (Radziminski et al. 2013), bench press “bench press” (6 to 12% better) (Iacono et al., 2015), upper body power (1 to 7% better) (Delextrat and Martínez, 2014) and lower body power (1 to 4% better) (Delextrat and Martínez 2014) were also analyzed.

An intermittent high-intensity running effort would also allow the development of VO₂max while developing anaerobic capacity (Mac Mahon and Wenger, 1998; Bogdanis et al, 1995).

For the speed force, in the context of the work of (Fukanaga, 2002) showing the plyometric work which allows the production of a great force, and the work of (Bosco, 1992) and the work of (cometti, 2007) explain this by increasing the elastic property of the muscle, allowing it to increase its efficiency during plyometric work.

The results of our study fit into the context of findings (Adams, 1992), as it was found that performance is up to three times combined with strength training and plyometric training, when comparing it separately to strength training or to plyometric training.

Cometti, 2012) also found that working with weight training allows for an increase in explosiveness, and that adding it to plyometrics allows for diversification of training.

There are many explanations at the molecular level:

(Mackintosh, 2004) explains it by increasing the phosphorylation of actin and myosin chains, which makes them very sensitive to calcium, which is the first excreted in the muscle by the

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endoplasmic networks after having penetrated sodium ions from that the depolarization wave of the nerve fiber reaches the muscle fiber.

(Duchateau, 2003) explained it by increasing the frequency at the level of the nerve fibers and thus increasing the value of the neuronal flow, including neurotransmitters, therefore greater recruitment of muscle fibers, as Sall adds with a more great recruitment of motor units which increase muscle strength.

Furthermore, the study of (Victor, 2013) and (Charles, 2014) were in the same context as the results of our study and proved that strength training is an effective way to improve performance, and for the training is more effective, these studies recommended that it be carried out individually to determine the load.

It also confirmed (cometti, 2012) that maximum strength increases by 150 to 200% when working on plyometrics.

The study of (Alexandre Hidalgo, 2013) went in the same direction because it proved that mixed training improves performance in both Squats Jump and Countermovement Jump (CMJ), and the study of (SofianHamdi, 2012) came to show that the training program with plyometrics alone or weight training alone does not improve performance in the SJ and CMJ, even if the training period lasted six weeks. This is what was confirmed by (Weineck, 1997), which shows the increase in force, speed and explosiveness when the two types of training (bodybuilding and plyometrics) are combined.

Cometti, 2012) A large construction allows the travail with muscle to increase the expansion, and it allows the plium to diversify the training.

There are a number of complications in the skin:

(Mackintosh, 2004) This increases the phosphorylation of actine and myosine cells, which causes sensitive amounts of calcium, which is the first effect in the muscle by endoplasmic endoplasmosis after the onset of sodium ions. That causes the depolarization of the nerve fibers at the fiber musculature.

(Duchateau, 2003) It increases the frequency of nerve fibers and increases the nerve flux value, y Great recruitment of unités motors that augment the muscle force.

Outside, the studies of (Victor, 2013) and (Charles, 2014) are in the context of the results of our studies and it reveals that the muscle is more effective than the performances, and for that. This training is more effective, these studies help you understand that this effect is individual to determine the charge.

It has been confirmed (cometti, 2012) that the maximum power increases from 150 to 200% in the plyometric work.

6. Conclusion:

We noted that the footballer covered a total distance of between 9995 m and 11233 m (Rampinini et al, 20007a). These data reinforce the fact that endurance and aerobic capacity are important qualities in football (e.g. Bangsbo, 1994a). However, football training requires specific endurance work because it is a so-called “intermittent” sport.

Intermittent exercises short duration runs would be highly specific to football activity (Balsom, 1995) because they would make it possible to solicit both anaerobic (Bangsbo, 2008, Gaitanos et al, 1993) and aerobic energy metabolism (Bangsbo, 2007; Dupont, 2003). They act in particular in the optimization of $\dot{V}O_{2\max}$ (Billat et al, 2002), in the development of the activity of oxidative enzymes (Parolin et al, 1999) while having an action on peripheral components (Thompson et al, 1999),The benefit of intermittent exercise is undisputed in the football world. However, the choice of different characteristics such as recovery times (Dupont et al, 2004) and working times (Balsom, 1995) must be defined with caution. The IFT 30-15 test (Buchheit, 2008) would be a tool that makes it possible to better control and better define the main characteristics of intermittent short-term work. The application of these exercises in line or in shuttle is physiologically different (Bisciottiet al, 2000) but their use will be just as important depending on the time of the season (Grosgeorge and Dellal, 2005).

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