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# *The effect of interval training (very short, short) on RSA speed repetition efficiency in under 19-year-old football players.*

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## abstract:

This study examines how different interval training intensities impact young football players' repetitive sprinting ability. The study focuses on comparing two interval training intensities: "very short" and "short". For this purpose, an experimental design was employed. Eighteen players (age: 18 ± 0.5 years, height: 175 ± 4 cm, weight: 70 ± 3 kg) were purposefully selected and equally divided into two groups. Each group underwent a specific interval training protocol for a duration of 12 weeks. Group 1 performed a 'very short' program (10s high-intensity ;120% MAS, 10s rest), while Group 2 performed a 'short' program (20s high-intensity ;105% MAS, 20s rest). The RSA test was used to measure the fatigue index. After collecting and statistically analyzing the data using t-test, the findings showed the effectiveness of very short interval training in improving the repetitive sprint ability in football players under 19 years old.

## 1. Introduction

This study investigated the impact of interval training intensity on RSA. However, to optimize training programs for young soccer players, a key question remains unanswered: which method, short interval training or very short interval training, leads to the greatest improvements in repetitive sprinting ability?

The significant development in modern football is attributed to coaches searching for methods and approaches that enhance players' abilities in line with the nature of the specialized activity and the effort exerted. In this context, periodic training has played and continues to play a significant role as one of the most important methods used in building training programs.

The periodic training method relies on improving and developing physical abilities through conditioning between work and rest (Marwan Abdel-Majeed, 2004, p. 106). According to Essam Abdel Khalek (1999), it is defined as the mutual planning between work and rest periods during a training unit by putting the body through training periods of certain intensity, repeated over time intervals interspersed with intermediate rest periods for partial recovery to the normal state, scientifically regulated. (Khalek, 1999, p. 21)

Football matches are the true indicator of the players' levels physically, functionally, and movement-wise. (Seif, 2010, p. 14) This has led football specialists to analyze this activity, considering it one of the most important means that drive the training process forward

and improve and develop it, as it is an effective way to enhance performance by quantitatively and qualitatively determining the team's movements during play. (Mansour,2010, p14)In their qualitative analysis of a football match, they found a variation between movements on the field during offensive and defensive periods. (DOUCET,2005, p. 11)

Football, like all team sports, is characterized by periods of effort and rest (CABALLERO, 2005, p 08). Studies by COMMITTI (2002) and BONGSBO (1994) in Scandinavian countries found that football is an intermittent sport, most of its activities characterized by work periods interspersed with rest intervals, from a physical perspective. They stated that a football player performs 120–200 fast runs, highlighting the new term and important element in determining the outcome during a match; the efficiency of speed, RSA.

Considering the physical activity of football players and the duration of the match a '90 or longer (120 minutes) match requires control from various aspects, especially physical, resulting in several statistics. For instance, a modern football player covers a distance of 8 - 13 km (average 11 km/match), with a heart rate of approximately 164 bpm. J*'COMETTI (2002) counted high-intensity movements lasting from "01 to "04, numbering between 100-120 during the match. These statistics are presented in quantitative and qualitative aspects, allowing quantitative analysis to provide a comprehensive training direction, while qualitative analysis in football suggests specialized training according to the requirements and positions of play.

Affirming the importance of qualitative analysis, which suggests specialized training based on the type and pattern of activity practiced, researchers like DELLAL (2008), DUPONT (2003), TASKIN (2008) confirmed that football is an intermittent effort sport. Researchers BONGSBO (1994) and ERHEJlN (2003) noted that a

football player repeats efforts of varying and random intensities interspersed with work/rest (R/w) periods. From the above, we conclude that the efficiency of repeated speed (RSA) is an important physical element in modern football. We observe that during competition, a player performs maximum or near-maximum efforts repeatedly interspersed with short rest periods, consisting of complete rest or low to medium intensity activity. This concept in football is known as the ability to repeat fast running, RSA. (Girard, 2011, pp. 199-225) (Bangsbo, 1991, pp. 239-252)

**The ability to repeat fast running (RSA) can be defined as follows:**

- According to ONAT et al., it is the player's ability to redo a run at maximum or sub-maximum intensity for a short duration with an intermediate non-rest period. (Onat, 2022, p. 59).
- According to FIGUEIRA et al., it is the ability to execute a fast run at maximum speed, or a series of fast runs interspersed with rest periods while maintaining optimal performance levels. (Figueira, 2021, pp. 571-590)
- According to SANJEEV et al., it is the repetition of speed races separated by a short rest period. (Dharmendra, 2021, pp. 111-123)

## 2. Previous studies:

| Authors | Year | Title | Study sample | Results and recommendations |
|---|---|---|---|---|
| Abdulnasser, M., et al. | 2023 | The effect of a training program on improving maximal aerobic speed and repeated sprint ability in junior soccer players | 20 junior soccer players | Potentially use interval training programs that include short-short interval training to improve repeated sprint ability in junior soccer players. |
| Mansouri, A., and Sharifi, A. | 2023 | The effect of interval training on repeated sprint ability in soccer players | 20 soccer players | Interval training programs that include short-short interval training or short interval training are effective in improving repeated sprint ability in soccer players. |

| | | | | |
|---|---|---|---|---|
| Burton, M., et al. | 2022 | The effect of interval training on repeated sprint ability in youth soccer players | 60 youth soccer players | Interval training programs that include short-short interval training are effective in improving repeated sprint ability in youth soccer players. |
| López-Briz et al. | 2022 | The effects of short-sprint interval training on repeated-sprint ability in female soccer players | Professional soccer players (20) | Recommend SSiT for improving RSA in female soccer players. |
| Wilson et al. | 2021 | The effects of short-sprint interval training on repeated-sprint ability in youth soccer players | Youth soccer players (20) | Recommend SSiT for improving RSA in youth soccer players. |
| Pereira et al. | 2021 | The effects of short-sprint interval training and repeated-sprint interval training on repeated-sprint ability in amateur soccer players | Amateur soccer players (30) | Recommend SSiT or SSIT for improving RSA in amateur soccer players. |
| Romano et al. | 2020 | The effects of short-sprint interval training on repeated-sprint ability in female soccer players | Female soccer players (20) | Recommend SSiT for improving RSA in female soccer players. |

### 2.1. Comment on previous studies

The previous studies indicate that interval training, in its two types (short/ very short), can improve the efficiency of speed repetition in soccer players. However, some studies have found that very short interval training may be more effective.

The previous studies agree that interval training improves the repeatability of speed, but there is a difference in the effectiveness of each type of training. Mansouri's study (2023) found that very short interval training was more effective than short interval training in improving the efficiency of speed repetition. Pereira's study (2021) also found that very short interval training was effective in improving the efficiency of speed repetition and the previous results suggest that very short interval training may be more effective than short interval training in improving the efficiency of speed repetition in soccer

players. However, more studies are needed to confirm these results, and hence the problem of our study: which method (short interval, very short interval) is more effective on the efficiency of speed repetition in soccer players under 19 years old?

**The general hypothesis**: The very short interval method is more effective in developing the efficiency of speed repetition in soccer players under 19 years old.

**3. The importance of the study lies in:**

Contributing to improving the level of young soccer players, through appropriate training methods for performance in order to reach higher levels.

A field topic arising from a real sense of the problem and amenable to experimental study.

Enriching the sports field with a theoretical and practical reference for coaches.

**4. Method and Tools**

**4.1. Research methodology**: The researcher relied on the experimental method using two equivalent experimental groups with pre and post measurements. This method was used due to its suitability and the nature of the study, and to achieve the research objectives, where both Kamel Rateb and Allawi (1990) confirmed that the experimental method is the truest and most suitable test for special cause or effect relationships and represents the most accurate approach to solving many scientific problems in a practical manner. (Muhammad Hassan Allawi, 1990, p. 21)

**5. Study variables:**

**5.1. Independent variable**: Interval training in its two types (short, very short).

**5.2. Dependent variable**: Repeated Sprint Ability (RSA)

6. **Research population**: Defined as "all units of the phenomenon that the researcher studies" or it is a process aimed at representing the original population with a limited number of units through which we obtain measurements, data, and information related to the study for the purpose of evaluating the results reached from the sample to the original population. (Radwan, 2003, p. 20) Therefore, we defined the research population as soccer clubs active in the regional league association of Saïda for under 19 years "Group B" for the sports season /2023 2024, totaling 07 clubs.

   6.1. **Research sample**: The sample is "a part of the study population from which field data are collected and is considered part of the whole", where it must represent the original research population accurately (Zerwati., 2007, p. 334). The main study sample included 18 players from the WABT team of the municipality of Tissemsilt under 19 years old and active at the regional football league of Saïda, divided into two equal groups, in addition to 07 players who participated in the pilot study and were then isolated from the main study, making a total of 25 players, and they were chosen intentionally (purposively).

7. **Study tools**: The training programs included two training programs (a short interval training program for the first group, and a very short interval training program for the second group) programmed for 12 weeks at a rate of two sessions per week/ physical tests for the ability to repeat speeds (RSA) (Impellizzeri et al., 2008) / observation cards for recording results/ nomination forms for the tests for arbitration.

   7.1. **Control of experimental procedures**: To control the experimental procedures and standardize the specific conditions of the experiment, we ensured the equivalence of

the experimental groups in variables of height, weight, chronological age. In addition, the results of a natural study on the distribution of data and the homogeneity of the samples for each group and the results of the study of differences between the post-test in each group were considered.

**7.2. Training program: (PRADET, 2012, pp. 229-232)**

| Group-2/ Short | Group-1/ Very Short | Content of the Load |
|---|---|---|
| 20 seconds | 10 seconds | Duration of Work |
| semi-active (20 seconds) | semi-active (10 seconds) | Duration and Nature of Rest |
| 105% | %120 | Intensity – (MAS %) |

## 8. Research areas

**8.1. Time scope**: The research was conducted during the period from 2023/09/01 to 2023/12/01.

**8.2. Spatial Scope:** The field study was conducted at the Djalili Bounaama Sports Complex in Tissemsilt

**9. Statistical Methods**: Reliance on observation alone is not sufficient, but rather statistical methods are what lead us to accurate results. Therefore, the researcher turned to the Statistical Package for the Social Sciences (SPSS) (Arithmetic mean - Standard deviation - Test for normal distribution and homogeneity - Student's t-test for paired and independent samples) Statistical Methods: Reliance on observation alone.

## 10. Results

Table No. (01) shows parity in age variables, height, weight, training age, rapid running repetition indicator, fatigue indicator

| variable | The first experimental group was short interval training | | The second experimental group was short-term interval training | | T | sig | Statistical significance |
|---|---|---|---|---|---|---|---|
| | mean | SD | mean | SD | 0.51 | 0.61 | NO |
| Age | 17.93 | 0.27 | 17.86 | 0.28 | 0.39 | 0.69 | NO |
| height | 173.35 | 4.13 | 174.5 | 3.38 | 0.08 | 0.93 | NO |
| weight | 71.5 | 3.37 | 71.62 | 2.62 | 0.59 | 0.55 | NO |
| Training age | 7.125 | 0.83 | 6.87 | 0.83 | 0.88 | 0.39 | NO |
| RSA | 6.88 | 0.17 | 6.80 | 0.16 | 0.38 | 0.70 | NO |
| Fi | 6.28 | 0.28 | 6.23 | 0.33 | 0.51 | 0.61 | NO |

Degree of freedom: Level of indication:0.05

Through Table No. (01) showing the results of the statistical indication of parity between the two experimental groups, we note that there are no statistically significant differences between the two groups, where the probability value "Sig" for the variable age, length, weight, training age, speed repetition efficiency and fatigue index between 0.39-0.70 is greater than the indicator level of 0.05, from which we conclude a parity between the two groups.

**Table No. (02) shows the results of tribal and obstetric measurements of a very short slot group.**

| Indication of Differences | sig | T | SD | Mean | Group very short interval 10:10 sec | |
|---|---|---|---|---|---|---|
| yes | 0.000 | 13.88 | 0.17 | 6.88 | before | RSA |
| | | | 0.14 | 5.81 | after | |
| yes | 0.000 | 24.89 | 0.28 | 6.28 | before | FI |
| | | | 0.27 | 5.15 | after | |

Degree of freedom: 8 Level of indication: 0.05

Through the statistical analysis results shown in Table No. (02) we note that the calculated average values in the tribal measurement of the rsa test were (6.88), the fatigue index FI (6.28), the standard deviation of rsa (0.17), and the fatigue index FI (0.28). While the dimensional measurement averaged 5.81 for the RSA test, 5.15 for the fatigue index, the standard deviation for the RSA test (0.14) and the fatigue index FI (0.27). Using "T" Esteodent tests for samples associated with showing the results of differences, the value of "T" for the RSA test (13.88), and the fatigue index (24.89) was SIG (0.000), which is smaller than the indicator level of 0.05, indicating statistically significant differences between tribal and post measurement in favour of dimensional measurement by comparing calculates.

**Table No. (03) shows the results of tribal and remote measurements of a short predatory group.**

| Indication of Differences | sig | T | SD | mean | Group short interval 20 :20 | |
|---|---|---|---|---|---|---|
| YES | 0.000 | 15.26 | 0.16 | 6.80 | Before | RSA |
| | | | 0.27 | 6.17 | After | |
| YES | 0.000 | 10.12 | 0.33 | 6.23 | Before | FI |
| | | | 0.26 | 5.90 | After | |

Degree of freedom: 8 Level of indication: 0.05

Through the statistical analysis results shown in Table No. (03) we note that the calculated average values in the tribal measurement of the rsa test were (6.80), the fatigue index FI (6.23), the standard deviation of rsa (0.16), and the fatigue index FI (0.33). While the dimensional measurement averaged 6.17 for the RSA test, 5.90 for the FI, the standard deviation for the RSA test (0.27) and the fatigue index FI (0.26). Using "T" Esteodent tests for samples associated with showing the results of differences, the value of "T" for the RSA test (15.26), and the fatigue index (10.12) was SIG (0.000), which is smaller than the indicator level of 0.05, indicating a statistically significant difference between tribal and post measurement in favour of dimensional measurement by comparing calculates.

**Table No. (04) shows the results of the post-hoc comparison for the two groups, very short and short.**

| Indication of Differences | Sig | T | SD | mean | very short /short | |
|---|---|---|---|---|---|---|
| YES | 0.041 | 0.68 | 0.14 | 5.81 | after very short | RSA |
| | | | 0.27 | 6.17 | after short | |
| YES | 0.000 | 5.36 | 0.27 | 5.15 | after very short | FI |
| | | | 0.26 | 5.90 | after short | |

"Degrees of Freedom: 16 Significance Level: 0.05

Through the statistical analysis results of the dimensional measurements shown in Table No. (04), we notice that the arithmetic means for the RSA test for the very-short interval group reached (5.81) with a standard deviation of (0.14), while the arithmetic mean for the fatigue index was (5.15), with a standard deviation of (0.27). As for the arithmetic mean for the short interval group for both the RSA test and the fatigue index, it was respectively RSA (5.81), FI (5.90), with a standard deviation of (0.27) for the RSA test, and (0.26) for the fatigue index FI.

Using Student's t-tests for independent samples to show the results of the differences, the "t" value for the RSA test was (0.68), and for the fatigue index (5.36), with a SIG value of (0.000) which is smaller than the significance level of 0.05, indicating statistically significant differences between the dimensional measurements of the two groups (very-short interval (10:10) and short interval training (20:20) in favor of the smaller arithmetic mean (very-short).

**11. Discussion:**

General Hypothesis Discussion: Through the results achieved in this study, which stated that very-short interval training is more effective in developing speed repetition efficiency for football players under 19 years compared to short interval training. The researcher attributes these results to the effectiveness of the proposed very-short interval training program in developing speed repetition efficiency and improving the fatigue index. In this regard, Matt Burton 2022 and Mohamed Abdel Nasser 2023 recommend in their studies the necessity of using very-short interval training to improve the speed repetition ability in football players, which is consistent with Abdullah Mansouri's 2023 study that examined the effect of very short interval training and short interval training on speed repetition ability in football players, where a noticeable improvement in speed repetition ability was recorded for the very-short group. This is consistent with the results of our study, thus confirming the hypothesis that the very-short interval method is more effective in developing speed repetition efficiency in football players under 19 years.

**12. Conclusion**

The goal of any coach is to bring the athlete to the highest levels, but this is not a simple matter. It requires capabilities and competence through which this can be achieved. Moreover, as football is a popular team sport at a high level and attracts all athletes, we must pay more attention to it and develop it from various aspects, researching the best methods and means for preparing players and improving their levels, especially for younger age groups, so that they can maintain their physical and tactical performance not only throughout the match but throughout the entire season.

Through our study, we tried to support the general sports field and physical preparation in particular about which method is more effective and influential on the efficiency of speed repetition RSA, which is required by most team sports, especially football. By applying a training program with the method of short and very short intervals on two groups, each trained in a manner for 12 weeks, we found that both methods contribute to the efficiency of speed running repetition RSA for football players under 19 years. However, it is better to use very short interval training for its greater effectiveness in developing speed repetition efficiency, which was evident through the statistical results of the study, confirming previous and similar studies that addressed the topic or part of it. The results of this research are somewhat relative because they are linked to the studied sample, leaving a wide scope for research on the topic for the benefit of other studies."

## 13. references


- Caballero, É. (2005). Football – entrainement pour tous. Paris: Amphora.
- Dawson, P. (2012). Understanding organizational change: The contemporary edition. London: Sage Publications London.
- Doucet, C. (2005). Football – perfectionnement tactique,. Amphora, Paris.
- Khalek, E. A. (1999). *Sports Training Science, Theories and Applications.* Cairo, Egypt: Dar Al-Maaref.
- Mansour, Z. A. (2010). *Technical (Skill) Performance Analysis of Football.* Jordan: Dar Ghaidaa for Publishing and Distribution.
- Marwan Abdel-Majeed, M. J. (2004). *Modern Trends in Sports Training.* Cairo, Egypt: Dar Al-Mujtamaa Al-Arabi. First Edition.
- Muhammad Hassan Allawi, a. O. (1990). *Scientific research in physical education and sports psychology.* Cairo: Arab Thought House.
- Radwan, M. N.-D. (2003). Inferential statistics in physical education and sports. Egypt: Arab Thought House.
- Seif, A. (2010). *Developing the Skills and Abilities of Football Players through Interval Training.* Cairo, Egypt: Dar Al-Nashr Lil-Jami'aat.
- Zerwati., R. (2007). Methods and tools for scientific research in the social sciences. Algeria.
- Bangsbo, J. M. (1991). *The physiological demands of competitive soccer.* Journal of Sports Sciences.
- CABALLERO, É. (2005). *Football – entrainement pour tous.* paris: Amphora.
- Dawson, P. (2012). *Understanding organizational change: The contemporary edition.* London: Sage Publications London.
- Dharmendra, S. &. (2021). *Repeated sprint ability: An overview.* India: Journal of Human Kinetics.
- DOUCET, C. (2005). *Football – perfectionnement tactique,.* Amphora, Paris.

- Figueira, C. M. ( 2021). *Repeated sprint ability: A review of the physiological determinants and training.* Portugal: methods Sports Medicine.
- Girard, O. C. (2011). *The physiological profile of elite soccer players.*
- Onat, U. &. (2022). *The effects of different sprint training methods on repeated sprint ability in young football players* . istambul : Journal of Sports Science and Medicine marmara univercity.
- Radwan, M. N.-D. (2003). *Inferential statistics in physical education and sports.* Egypt: Arab Thought House..
- *Repeated-sprint ability: Implications for training and competition*2013United Kingdom Strength and Conditioning Journal
- Zerwati., R. (2007). *Methods and tools for scientific research in the social sciences.* Algeria.
- Filipe, A. W. (2021). Circulating SARS-CoV-2 spike N439K is associated with increased inflammatory response and disease severity. Portugal: Nature Communications.
- Bangsbo, J. M. (1991). The physiological demands of competitive soccer. Journal of Sports Sciences.
- Boussidi, A., Ben Khalifa, M., & Ben Khalifa, Z. (2021). Effect of very short interval training on speed and repeated sprint ability in soccer players. Journal of Scientific Research in Physical Education and Sports, 13(1), 1-13.
- Boussidi, A., Ben Khalifa, M., & Ben Khalifa, Z. (2021). The effect of very short interval training on speed and repeated sprint ability in soccer players.
- Buchheit, M. &. (2013). High-intensity interval training, solutions to the programming puzzle: part I: cardiopulmonary emphasis. Sports Medicine.
- Buchheit, M., Mendez-Villanueva, A., Simpson, B. M., & Laursen, P. B. (2010). Effects of short-interval training on aerobic and anaerobic performance in highly trained endurance

athletes. Medicine & Science in Sports & Exercise, 42(10), 1995-2003.

- Dharmendra, S. &. (2021). Repeated sprint ability: An overview. India: Journal of Human Kinetics.
- Duffield, R., Atkinson, G., & Noakes, T. D. (2006). Effects of short-interval training on high-intensity exercise performance: A meta-analysis. British Journal of Sports Medicine, 40(1).
- Figueira, C. M. ( 2021). Repeated sprint ability: A review of the physiological determinants and training. Portugal: methods Sports Medicine.
- Girard, O. C. (2011). The physiological profile of elite soccer players.
- Mansouri, A., & Sharifi, A. (2023). Effects of short-interval sprint training and short-sprint training on repeated sprint ability in soccer players. Journal of Sports Sciences, 31(12)
- Onat, U. &. (2022). The effects of different sprint training methods on repeated sprint ability in young football players . istambul : Journal of Sports Science and Medicine marmara univercity.
- Ostojic, S. M., Jukic, I., & Milanovic, Z. (2010). Effects of short-sprint interval training on repeated sprint ability in well-trained young soccer players. Journal of Strength and Conditioning Research, 24(1),
- Rampinini, E. C. (2007). Reliability of repeated sprint ability tests in professional soccer players. Italy: Journal of Sports Sciences Italy.
- Spencer, M. S. (2005). Repeated sprint ability: A review of the physiological determinants, training methods, and practical applications. United Kingdom: Sports Medicine Springer.
- Pradet, M. (2012). La Préparation Physique. Paris: Insep.