*Journal of Sport Science Technology and Physical Activities*
**ISSN : 1112-4032**
**eISSN 2543-3776**

**VOL:17 / N°: 2** December **(2020), p :171-185**

# Relationship between two methods of perceived exertion (Session - RPE, Exercise - RPE) to evaluate the training load of amateur soccer players in the physical preparation phase.

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**ARTICLE INFORMATION**
Original Research Paper
Received : 15/07/2020
Accepted : 04/10/2020
Published :01/12 /2020

**Keywords :**
Method (Session -RPE)
Method (Exercise- RPE)
Training load

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**Abstract**

This study aims to determine the relationship between two evaluation methods of training load through some aerobic and anaerobic training sessions during the physical preparation phase for football players (Session - RPE, Exercise - RPE). The researcher used the descriptive method. The sample was chosen intentionally and consisted of under 20 years 10 players from Najm Ain Oulmene football team (E.S.A.O), The activists at the level of the first regional section of the Constantine League, we used to collect data for the estimation scale (Session - RPE, Exercise - RPE) and the method The statistic used in the research was Pearson correlation coefficient and linear regression analysis.

Results showed a strong correlation during aerobic trainings, while we found an average correlation during anaerobic trainings, and on this basis, we recommend that attention be paid to evaluating the training load by different (RPE) methods.

## I. Introduction

Football is a sport practiced enthusiastically around the world. It combines between fun, fighting, strength, speed and endurance (Hamek et al., 2018), it is also one of the sports in which the player is characterized by long distance running, where the player plays between running, walking and fast running (Boufaden, 2016). There is no doubt that the level of the sport in the various sports known has made a big step forward, as confirmed by the record-breaking day after day, which fulfilled the dream of workers in the field of sports, thanks to this huge development of the great scientific development in the methods of training and The preparation of the players was based on the scientific facts presented by the various sciences, whether they were in the biological, psychological or social field, and that the trainer benefits effectively to improve the implementation of the training process (Ghidi and saad, 2019).

The growing aspiration to sport successes according to the science of sport insists and goes through new demands and tireless research on the means of action and the methods of preparation of high-performance athletes. This only became possible thanks to the new leap in technical and scientific progress (Bensalem et al., 2020).

Modern day coaches rely on Integrated physical preparation Where It's the improvement of potential physiological characteristics of the player in close relation to the motor activity of football, this concept of integration is in fact synonymous with improving physical qualities through specific motor skills and activity practiced (Ghoual and Bengoua, 2015).

The monitoring of training load helps to understand how players are adapting to, and recovering from training (Weston, 2018).

There are several ways to codify the training load. Among these methods is the objective method, which means measuring the degree of load using scientific devices, and it is the most accurate, as it is done through laboratory and field tests and analyzes (Mufti Ibrahim, 2001). including measuring Heart rate (HR heart rate meter), measurement of maximum oxygen consumption (vo2max, blood acid level in LA- Lactometer), measuring distances covered and the nature of their performance (different performance speeds) with a device GPS: Global Positioning System.

There are some factors that can be difficult to use on a large scale in football clubs in particular, These devices can be expensive, require a high level of technical expertise, and data analysis takes a lot of time (Dellal, 2008). But the method RPE (Rating of Perceived Exertion), that Foster et

al used appeared (Foster et al., 2001), which is modified and developed for that proposed by (Borg, 1962), as the categories of perception The perceived Exertion is associated with multiple physiological measures (Heart rate, maximum oxygen consumption, lactic acid) (Hourcade J.C. et al., 2017).

The subjective responses to exercise is based on the combination of physiological, psychological, and performance factors, these factors combine and are processed by the individual exerciser to form a perceptual response that is measured as the RPE, which is strongly related to a variety of physiological variables, including HR, muscle and blood lactate, and oxygen consumption. (Kilpatrick et al.,2020). As it was confirmed that the (Session - RPE) method is valid for group and individual sports from several previous studies where Menem Haddad and others (Haddad.M et al.,2017) reviewed thirty-six studies that demonstrated this method to be correct, though some would recommend combining it with other physiological indicators such as heart rate (Haddad.M et al., 2017).

If strong correlations are observed between (Session - RPE) training loads and those associated with heart rate-based methods in exercises of low to medium intensity, the correlation level can be much weaker for efforts at high and very high intensity, their use may represent specific limits , where the Session is fully classified, and the specific training load cannot be distinguished from different efforts Which constitute a training session in football (technical and tactical exercises of medium intensity, long or intermittent exercises, speed and strength exercises with high intensity ..etc), in addition to arranging exercises in the Session according to the degree of difficulty, and as far as we know One study has been proposed which is quantitative estimate for Exercise (Exercise - RPE) by a group of researchers (Hourcade J.C. et al., 2017), where the goal of the study was to analyze the training loads of a professional soccer team over the course of seventeen week of competition, I conducted this study with a professional French team consisting of (24) soccer players, and from this we decided in this study to highlight the relationship between the two methods (Session - RPE, Exercise - RPE) to evaluate the training load of amateur soccer players in the physical preparation phase, where in the context of all of this the general question of the study was defined as follows:

* Is there a relationship between the two methods (Session - RPE, Exercise - RPE) to evaluate the training load during the training sessions for the

amateur soccer players in the physical preparation phase? and subscales this question the following sub-questions:

* Is there a statistically significant correlation between the two methods (session - RPE, exercise - RPE) to evaluate training load during some aerobic training sessions for amateur football players in the physical preparation phase?

* Is there a statistically significant correlation between the two methods (session - RPE, exercise - RPE) to evaluate training load during some anaerobic training sessions for amateur football players in the physical preparation phase?

**1.1. Literature Review**:

In view of the review of previous studies and similar studies, we can ask ourselves directly about any suitable measurement method in football, due to the great diversity in objective and subjective measurement methods, and the imposed intensity during different training situations, which include aerobic and anaerobic exercises.

We have chosen to study subjective methods, specifically Foster's (RPE) method (Foster et al., 2001), and many previous studies related to football as (Impellizzeri et al., 2004; Alexiou and Coutts, 2008; Wallace et al., 2009; Gomez Perez et al., 2011; Campos Vazquez et al., 2015; Weston, 2018... etc.), which reported that (Session - RPE) is used mainly by many clubs at the amateur and professional level, and that it was not originally designed to assess the training load in soccer, but rather to determine the training load in the aerobic sessions, however, due to its association with Physiological indicators, especially heart rate which has been applied on soccer players of various levels and classes, and has been proven correct in many researches.

And since the training session in football consists of a set of exercises, another method has emerged that depends on assessing the training load for each exercise, which is the (Exercise - RPE) method suggested by (Hourcade J.C et al., 2017) and others and applied in the competition period. Based on the literature review, we Assume that there is a correlative relationship between two methods of perceived exertion (Session - RPE, Exercise - RPE) to assess the training load of amateur football players in the physical preparation phase, and the aim of this study is to find out the validity of the two methods and the relationship between them during the evaluation of the training load of football players, in various aerobic and anaerobic training sessions in the physical preparation phase.

## II. Method and Materials :

### Identify terms and concepts:

**Method (Session - RPE):** The RPE method (Rating of Perceived Exertion), proposed by Foster et al, Means perceived Exertion according to the duration of the ration (Foster et al., 2001), the latter based on a scientific principle of the session rating of perceived exertion (RPE) is an indicator Accurate intensity of exercise (Borg, 1962), in direct relationship with many physiological indicators, such as heart reat and lactate in the blood, The calculation of the (TL) with the (CR10-session) method consists in multiplying the perception of the effort from CR10 by the entire duration of the sessions (in minutes), according to the following equation:

**TL = duration × CR10**, the result is expressed in arbitrary unit (u.a) (Hourcade J.C. et al., 2017).

**Method (Exercise - RPE):** For the calculation of the Training load with the (exercise-CR10) method, the following equation was used:

TL = duration of exercise1 × CR10 Exercise1 duration of Exercise2 × CR10 Exercise2… etc (Hourcade J.C. et al., 2017).

**Training load:** the training load is also a mixture of size, intensity, and density. It is described as the physiological stress imposed on the athlete. In several sources, two types of training load appear, namely, the internal load and the external load. When the exercise is programmed, its characteristics are determined in the initial stage (intensity, size, density), When these absolute values are expressed in relation to people's abilities, they appear to constitute the external load (Akenhead and Nassis, 2016).

**The exploratory study:** We conducted a prospective study before conducting the basic study, with the aim to controlling the organizational procedures for the measurement and field application process, ensuring the validity of information gathering cards, discovering the working environment closely and setting organizational matters with the team management (training timing, training days, providing means), explaining the way to answer the The metrics used and knowledge of the extent of the response of the research sample, knowledge of the time taken to perform these measures that measure the level of the training load, the difficulty that the researcher and the assisting staff may encounter during the implementation of the research, in addition to training the members of the research team and the distribution of roles and tasks.

**The curriculum used:** The curriculum means those procedures, rules and controls that have been put in a place in order to access and discover the facts, as it is a specific program for various ways to answer the questions and inquiries raised by the topic (seyah et al., 2020), or it is the road leading to the desired goal (Sahrawi and Bornan, 2012).

We have relied in our study on the descriptive (relational) approach, because it is the most appropriate approach to the study.

## 2.1. Participants:

**Study Population and Sample:** The research community is represented by the footballers under 20 years of the regional section of the Constantine Regional Association. As for the research sample, it is consisted of players from the basic line-up of the Najm Ain Oulmene club under 20 years who were chosen intentionally as they reached (10) male players of the same specifications, age and the same training age (more 3 years of training), excluding goalkeepers.

Table 1. Characteristics of study sample members (n =10)

| Variable | unit computational | mean measurement | standard deviation |
|---|---|---|---|
| Age | Years | 26 | 2,36 ± |
| Length | M | 1,74 | 2,68 ± |
| Weight | KG | 70 | 0,033 ± |
| Training age | Years | 3.12 | 2,66 ± |

## 2.2. Materials:

In order to find solutions to the problem and verify the validity of the research hypotheses, the most effective methods and tools must be followed through study and examination, and therefore will be based on two types:

**Theoretical study (bibliographic analysis):** represented by Arab and foreign sources and references, including books, notes, dictionaries, magazines and Internet.etc, the aim is to create a theoretical background that will help the researcher to complete the field study (Derradji and Aitlounis, 2020). In gathering information, we have relied on the Rating of Perceived Exertion (RPE) scale that was modified by (Foster et al., 2001), and we have also translated and modified some phrases to facilitate the task on the sample to understand in which the player selects the indicator from (0 to 10) immediately after the 30-minute session has ended, The question asked was: "How was your workout?", We also relied on the Exercise Scale (Exercise - CR10) proposed by J.C. Hourcade ،2017) and others, in which we developed a ladder with the same idea, in which the player selects the indicator (0 to 10) immediately after the completion of the exercise, to

calculate the training load using the method (Exercise - CR10) (Hourcade J.C. et al., 2017).

Table 2. The CR-10 scale adjusted by Foster et al. (2001). (Foster et al, 2001)

| Raiting | descriptor |
|---|---|
| 0 | Rest |
| 1 | Very Very Easy |
| 2 | Easy |
| 3 | Moderate |
| 4 | Somewhat Hard |
| 5 | Hard |
| 6 | |
| 7 | Very Hard |
| 8 | |
| 9 | |
| 10 | Maximum |

Table 3. The CR-10 scale method (Exercise - RPE)

| Raiting | descriptor | Exercise1 | Exercise2 | Exercise3 | Exercise4 |
|---|---|---|---|---|---|
| 0 | Rest | | | | |
| 1 | Very Very Easy | | | | |
| 2 | Easy | | | | |
| 3 | Moderate | | | | |
| 4 | Somewhat Hard | | | | |
| 5 | Hard | | | | |
| 6 | | | | | |
| 7 | Very Hard | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | Maximum | | | | |

## 2.3. Design and Procedure:

Training sessions were implemented on (artificial grass floor) in different climatic conditions, Each training session was held during the evening at (18:30) hours, a group of (10) football players implemented in (08) training sessions, during three weeks of physical preparation, due to the difference in the number of players participating in rations (injuries, absences, transfers, and available team choices), We noticed the effort awareness using the CR10 scale adjusted by Foster Thirty minutes after the end of the training and asking the question, "How was your workout?", Which we have adapted with the level of cognitive and mental players, the players had to choose to evaluate sessions using CR10 with an estimate from (0 to 10) and then the results were recorded in two phases:

– **First:** Each exercise was evaluated individually, then the whole was evaluated, then daily data was collected for each player in the observation cards.

- **Second:** The daily data was calculated in a computer by using the program (Excel), The various exercises were classified into three categories:

* Specific football games and exercises that include all competitive games with goalkeepers, ball conservation games, and technical and tactical exercises.
* Endurance exercises that include exercises with mostly long-term aerobic endurance and aerobic capacity.
* Extreme Power exercises, explosive strength, extreme speed exercises.

### 2.4. Statistical Analysis

The researcher resorted to the SPSS program to calculate the following equations: Pearson correlation coefficient, SMA, standard deviation, Linear regression analysis.

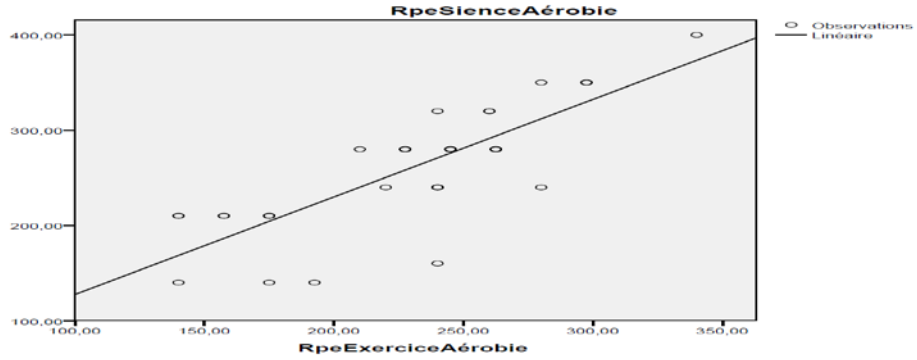
## III. Results:

### Presentation, interpretation and discussion of the results of the first hypothesis:

Table 4. Explains the relationship between the two methods (Session - RPE, Exercise - RPE) during aerobic trainings using the Pearson coefficient of correlation in the spss program:

| Aerobic trainings | SMA | standard deviation | Pearson correlation | Significance level | Sig value |
|---|---|---|---|---|---|
| Session - RPE | 262,2500 | 60,27661 | 0,81 | 0,01 | 0,000 |
| Exercise - RPE | 231,5625 | 47,62193 | | | |

Figure1. Demonstrates the linear relationship between the two methods (Session - RPE, Exercise - RPE) during aerobic trainings sessions:




**Analysis of the results:**

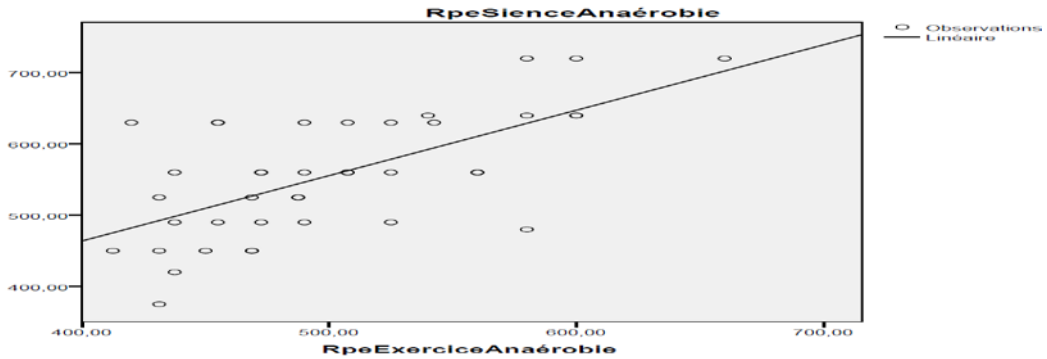
Through Table (04) and Figure (1), we find that the Pearson correlation coefficient between the two methods (Session - RPE, Exercise - RPE) to evaluate the training load through the aerobic training sessions that were applied to the players is equal to (0, 81), which indicates a very strong relationship with significant significance between the two methods (Session - RPE, Exercise - RPE), and it is a statistically significant relationship at the significance level of $\alpha = 0, 01$.

**Presentation, interpretation and discussion of the results of the second hypothesis:**

Table 5. Explains the relationship between the two methods (Session -RPE, Exercise- RPE) during anaerobic trainings using the Pearson coefficient of correlation in the spss program:

| Aerobic trainings | SMA | standard deviation | Pearson correlation | Significance level | Sig value |
|---|---|---|---|---|---|
| Session – RPE | 556,1250 | 85,66847 | 0,646 | 0,01 | 0,000 |
| Exercise - RPE | 500,5625 | 60,29372 | | | |

Figure 2. Demonstrates the linear relationship between the two methods (Session - RPE, Exercise - RPE) during anaerobic trainings sessions:




**Analysis of the results:**

Through Table (5) and Figure (2), we find that the Pearson correlation coefficient between the two methods (Session - RPE, Exercise - RPE) to evaluate the training load through the anaerobic training classes that have been applied to the players is equal to (0,64), which indicates an intermediate relationship It is of significant significance between the two methods, and it is also a statistically significant relationship at the level of significance $\alpha = 0, 01$.

## IV. Discussion :

**Discussion of the first partial hypothesis:**

Based on the analysis of the results from table (4, 6) and figure (1), we concluded that there is a strong correlation between the two methods (Session -RPE, Exercise - RPE), during the aerobic training sessions in the physical preparation phase, as shown in the following table**:**

Table 6. The average (CR10) and the average training load during the aerobic sessions for the two methods (Session - RPE, Exercise - RPE):

| RPE | RPE SE | RPE EX | RPE SE | RPE EX | RPE SE | RPE EX | RPE SE | RPE EX |
|---|---|---|---|---|---|---|---|---|
| SMA (RPE) | 3,4 | 3,15 | 4,1 | 3,475 | 2,7 | 2,32 | 2,4 | 3,775 |
| Duration | '80 | | '70 | | '70 | | '70 | |
| SML (TL) U.A | 272 | 242 | 287 | 243,2 | 189 | 162,75 | 294 | 264,2 |

**Discussion of the second partial hypothesis:**

Based on the analysis of the results from the table (5,7) and the figure (2), we concluded that there is a moderate correlation between the two methods (Session-RPE, Exercise-RPE), during the anaerobic

training sessions in the physical preparation phase, as shown in the following table:

Table 7. The average (CR10) and the average training load during the anaerobic sessions for the two methods (Session - RPE, Exercise - RPE):

| RPE | RPE SE | RPE EX | RPE SE | RPE EX | RPE SE | RPE EX | RPE SE | RPE EX |
|---|---|---|---|---|---|---|---|---|
| SMA (RPE) | 6,5 | 6,3 | 7,6 | 6,85 | 8,4 | 6,9 | 7,9 | 7,3 |
| Duration | '75 | | '70 | | '70 | | '80 | |
| SML (TL) U.A | 487,5 | 453,75 | 532 | 479,5 | 588 | 483 | 632 | 586 |

The use of (Session - RPE) methods has proven Its validity through many previous studies in football (Impellizzeri et al., 2004; Alexiou and Coutts, 2008; Gomez-Piriz et al., 2011; Campos-Vazquez et al., 2015; Weston, 2018; …ect), Impellizzeri et al see That "The results of this study show that the session-RPE can be considered as a good indicator of global internal load in soccer training.

This method does not require particular expensive equipments and can be very useful and practical for coaches and athletic trainers to monitor and control the internal load, and to design periodization strategies" (Impellizzeri et al., 2004), also Alexiou and Coutts see that "The session-RPE (TL) showes a significant correlation with all common training types in soccer, also Higher correlations were found with less intermittent aerobic-based training sessions and suggest that HR-based TLs relate better to session-RPE (TLs) in less intermittent training activities" (Alexiou and Coutts, 2008), also Clarke et al see that "This study provides confirmation that Session-RPE is an inexpensive and simple tool, which is highly practical and accurately measures an individual's response (internal TL) to the Canadian football practice" (Clarke et al.,2013), Furthermore, when considering the number of individuals involved worldwide in collision-based team sports, this tool has the potential to impact a large proportion of the global sporting community.

The use of (Exercise - RPE) method showed a very strong correlation with the (Session - RPE) method in addition to the results of Joan Hourcade study (Four months of overall exercise training load in professional soccer player), which reached to: The weekly (TL) calculated by the two methods was different in nine of seventeen weeks at the significance level ($P < 0.001$) but showed significant correlation (ICC = 0.82 [0.79, 0.84]), so the (Exercise - RPE) method is also considered valid during aerobic training

sessions that provide trainers with a certified alternative to quantitative measurement. We explain the presence of an average correlation between the two methods (Session - RPE, Exercise - RPE) to evaluate the daily training load during the anaerobic training sessions on the small convergence of the training loads that players felt during the exercise and during the session, where we also noted that the value of the training load varies in varying proportions from one player to another, due to the degree of difficulty of the anaerobic sessions, which are difficult to evaluate accurately, in contrast to the aerobic sessions that are easy to evaluate, where the greater the degree of difficulty of the exercise, the more difference in the sensitivity of the effort of the players, due to the load on the nervous system where Menem Haddad and others reached (Haddad.M et al., 2011) in his study of (Heart Rate Responses and Training Load During Nonspecific and Specific Aerobic Training in Adolescent Taekwondo Athletes), that the perceived efforts ranged between “hard” and “very difficult” during all sessions of high-intensity young training, and (Impellizzeri et al., 2004), also found that a possible explanation For the low correlations in his study of using RPE-based load in soccer (Use of RPE-based training load in soccer), is the increased anaerobic contribution to energy savings during soccer training, where an increased anaerobic contribution may be responsible for the increased (TL) Cell by increasing (RPE), and showed an increase (RPE) during intermittent exercises compared to the share of static exercise matching with the overall work , and this is what the (Hourcade J.C. et al., 2017) study came to, where I concluded that the evaluation of the training load between the two methods depends on The number of exercises perceived to be difficult in the session, the greater the frequency number, the greater the differences in the quantification and the lower the correlation coefficients.

"The exercise-CR10 method requires a little more time for scoring and more memory effort and could be more demanding.

For this reason, it would be wise to recommend the display of the content of the session before training, so that the players integrate the exercises and construction thereof beforehand"(Hourcade J.C. et al., 2017).

## V. Conclusion:

Our study came to identify some subjective methods through the study of Relationship between two methods of perceived exertion (Session - RPE, Exercise - RPE) to evaluate the training load of amateur soccer players in the physical preparation phase. Our results demonstrate that the (Session-RPE) method evaluates the training load better compared to the (Exercise - RPE) method. The correlation between aerobic Sessions is excellent and anaerobic Sessions is average, while the correlation between anaerobic Sessions varies according to the number of exercises that is challenging during the session. However, the two methods show coefficients close to ES variance, with all of our results indicating that either method can be used to monitor a player's training. The (Exercise - RPE) method allows coaches to distinguish between workout compositions and to have a more precise analysis of their effects. Finally, it makes it possible to check whether the prescribed loads have indeed been reached by individually analyzing the ratings of the target exercises and to calculate a total workout less influenced by the difficult exercise.

## VI. References :

1. Akenhead, R., & Nassis, G. P. (2016). Training load and player monitoring in high-level football: current practice and perceptions, *International journal of sports physiology and performance, 11* (5), 587-59.
2. Alexiou, H., & Coutts, A. J. (2008). A comparison of methods used for quantifying internal training load in women soccer players. *International journal of sports physiology and performance*, *3*(3), 320-330.
3. Bensalem, Salem1, Hobara Mohmed, Menella Rachid, (2020), Comparative study of aerobic and anaerobic alactic work capacity according to the positions occupied among footballers, *Journal of Sport Science Technology and Physical Activities,17(1),*13-28.
4. Boufaden Othman, (2016), Correlative study of anaerobic differential threshold and maximum oxygen consumption with strength and speed for footballers under 19 years of age, *Journal of Sport Science Technology and Physical Activities, 13*(13), 240-260.
5. Campos-Vazquez, M. A., Mendez-Villanueva, A., Gonzalez-Jurado, J. A., León-Prados, J. A., Santalla, A., & Suarez-Arrones, L. (2015). Relationships between rating-of-perceived-exertion-and heart-rate-derived internal training load in professional soccer players: a comparison of on-

field integrated training sessions. *International journal of sports physiology and performance*, *10*(5), 587-592
6. Clarke, N., Farthing, J. P., Norris, S. R., Arnold, B. E., & Lanovaz, J. L. (2013). Quantification of training load in Canadian football: application of session-RPE in collision-based team sports. *The Journal of Strength & Conditioning Research*, *27*(8), 2198-2205.

7. Dellal, A. (2008). *De l'entraînement à la performance en football*. De Boeck Supérieur
8. Derradji Abbes, Aitlounis morad, (2020), the impact of the interruption of training on muscle strength and maximum aerobic speed for football players, *Journal of Sport Science Technology and Physical Activities*, *17*(1) 17-27.
9. Foster, C. A. R. L. (1998). Monitoring training in athletes with reference to overtraining syndrome. *Medicine & Science in Sports & Exercise*, *30*(7), 1164-1168.
10. Foster, C., Florhaug, J. A., Franklin, J., Gottschall, L., Hrovatin, L. A., Parker, S., & Dodge, C. (2001). A new approach to monitoring exercise training. *The Journal of Strength & Conditioning Research*, *15*(1), 109-115.
11. Ghidi abdelkader, sedira saad, (2019), Training program for Speed Devlopment and its role in devloping the performance of football players, *Journal of Sport Science Technology and Physical Activities*, 16(*2*) 72-78.
12. GHOUAL Adda BENGOUA Ali, (2015), The Contribution of Integrated Physical Preparation to The Football training of young algerian Footballers U-17 (Combined physical and technical qualities), *Journal of Sport Science Technology and Physical Activities*, *12*(12) 11-27.
13. Gomez-Piriz, P. T., Jiménez-Reyes, P., & Ruiz-Ruiz, C. (2011). Relation between total body load and session rating of perceived exertion in professional soccer players. *The Journal of Strength & Conditioning Research*, *25*(8), 2100-2103.
14. Haddad, M., Chaouachi, A., Wong, D., Castagna, C., & Chamari, K. (2011). Heart rate responses and training load during nonspecific and specific aerobic training in adolescent taekwondo athletes. *Journal of Human Kinetics*, *29*(1), 59-66.
15. Haddad, M., Stylianides, G., Djaoui, L., Dellal, A., & Chamari, K. (2017), Session-RPE method for training load monitoring: validity, ecological usefulness, and influencing factors. *Frontiers in neuroscience*, *11*, 612.

16. Hamek Beghdad, Bengoua Ali, Remaoun Mohamed, (2018), The influence of the physical preparation by the method of competition on the physical form in football, *Journal of Sport Science Technology and Physical Activities, 15*(3) 26-35.
17. Hammad, Mufti Ibrahim, (2011), *Modern Sports Training*, Cairo: The Book and Publishing Center.
18. Hourcade, J. C., Saulière, G., Noirez, P., Toussaint, J. F., & Desgorces, F. D. (2017). Quatre mois de charge d'entraînement globale et par exercice chez le footballeur professionnel. *Science & Sports*, *32* (4), 221-228.
19. Impellizzeri, F. M., Marcora, S. M., & Coutts, A. J. (2019). Internal and external training load: 15 years on. *International journal of sports physiology and performance, 14 (2), 270-273.*
20. Impellizzeri, F. M., Rampinini, E., Coutts, A. J., Sassi, A. L. D. O., & Marcora, S. M. (2004). Use of RPE-based training load in soccer. *Medicine & Science in sports & exercise*, *36*(6), 1042-1047
21. Kilpatrick, M., Foster, C., Robertson, R., & Green, M. (2020). Scientific Rationale for RPE Use in Fitness Assessment and Exercise Participation. *ACSM's Health & Fitness Journal*, *24*(4), 24-30.

22. Sahrawi Murad, Bornan Sharif Mustafa, (2012), Descriptive study of correlation between body image and students' attitudes towards physical and athletic activity, *Journal of Sport Science Technology and Physical Activities,9,*205- 226.
23. Seyah zakaria, ould ahmad oualid, assam samir, (2020), A correlational study between body composition and explosive power of lower limbs with algerain male elite's basket-ball player's senior category, *Journal of Sport Science Technology and Physical Activities,17*(1),135- 150.
24. Weston, M. (2018). Training load monitoring in elite English soccer: A comparison of practices and perceptions between coaches and practitioners. *Science and Medicine in Football, 2*(3), 216-224.