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Comparative study between two methods of training load quantification through small-sided games in soccer

[1]Amra Zakaria;[2] Mahour bacha Mourad.

University of Algiers 3, Science and technology laboratory of physical and sport activity, Algeria, amra.zakaria@univ-alger3.dz , [2] mourad.mahourbacha@gmail.com.

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Corresponding author:
Amra zakaria,
E-mail :
amra.zakaria@univ-alger3.dz

Abstract

The study aimed to determine and control the training load during the Small-sided games in soccer through the use of methods of Training load quantification using technological devices, and the study was conducted on a sample of 18 players, out of a total of 500 players active in the Prince Mohammed bin Salman League at the level of 20 teams and was completed Selecting it intentionally and the researcher followed the experimental approach by applying the Small-sided games selected from the scientific studies, where the heartbeat and the intensity of the load are among the indicators to be measured by the modified Borg scale by Foster and using the Polarteam pro. After the statistical treatment, the results indicated a greater consistency for the maximum heartbeat of the Polar device, and therefore the maximum heartbeat method of the Polar device it's considered the most effective way to quantify training load during typical small-sided games.

I. Introduction

The directive on gaining physical fitness has become an urgent necessity to reach the appropriate appearance to prevent diseases in a way that guarantees the human being the superior competence in carrying out all his life tasks in its various fields, so it has become necessary to pay attention to physical fitness and its tests to elevate it to the required level to increase production. (Al-Boussafi et al, 2016)

As scientific interest in sports training has increased recently, sports training is concerned with the player from all sides and with the aim of developing sports performance to reach the top level, where planning for training young people in various sports activities has become a necessary means to advance the training status of players (Magrani and bin Zidan, 2015), it is not possible to reach the formation of an integrated and strong sports team that has good athletic performance unless there is an organized and organized scientific planning. (Bouhaj and Alili, 2018), and football like any other sports, but it is the most popular in the world, attracting hundreds of thousands if not millions of practitioners are concerned with success and winning titles. (Ben Neama and Ben Gouwa, 2018), the soccer player must be characterized by a high degree of fitness with all that the match need in order to raise its efficiency in order to be able to implement physical and skill tasks effectively (Msaliti, 2012), and to reach this achievement requires finding appropriate methods and solutions and discovering new methods to develop capabilities Physical, technical and tactical. (Fagloul Snoussi, 2014). One of the methods used is the mini-games or competition method, which is one of the best methods to stimulate the player's activity and increase the motivations of his practice towards performance. (Bin Zahabi, 2013) The importance of small sided-games lies in the ability to develope physical and physiological abilities of players, as it allows the development of all performance characteristics in football during the season. (Hidjab,2019)

Several studies have dealt with similar issues in determining training loads and small-sided games in soccer, including:

Alexander Dellal study, entitled: Analysis of the physical activity of the soccer player and its results in training orientation, a special application for high-intensity intermittent running exercises and small-sided games phd thesis 2008. (Dellal & al, 2008).

The Study aimed to highlight the various physiological responses during the small-sided-games and compare them with high-intensity intermittent running exercises with directional change, also studies have reported

contradictory results regarding the physiological impact of reduced games because the playing conditions were not similar and the level of motivation was difficult to control. The Research sample was 10 players belonging to the French first division (league 1).

Another study from Alexander Dellal, aimed to compare the cardiac responses during exercises with controlled physical loads (intermittent exercises for short runs) and during integrated physical exercises (small-sided games) in high-level. First, hypothesized that cardiac responses were similar between certain soccer-specific intermittent exercises and certain small-sided games, he then tested the hypothesis that between-subject's homogeneity of the HR was less important during reduced games compared to intermittent exercises.

The study of franck legall entitled football tests and exercises, medical and physiological follow-up, its Objectives was Rationing and monitoring the training load at different age and groups, by using a research sample of three 3 groups of the French National Institute for Football consisting of 20 to 25 players. Each player performs a medical and physiological examination at the beginning of the season.

The main objective is to Identify if there are differences between the use of the maximum heartbeat method of the Polar device with the heartbeat delivered by RPE, during the proposed Small-sided soccer game from a specific model 3 vs 3 by Dellal Alexandre & al, 4 vs 4 by Frank Legall, 8 vs 8 by Drust & Jones entitled physiological and technical demands of 4vs4 abd 8vs8 games in elite youth soccer players also to know if ladder with RPE and heart beats helps to quantify the load during the small-sided games.

From this standpoint, the methods of enhancing the physical training load will be compared to the relationship between the variables to enable a special program for Small-sided soccer games with consideration and control of the training load to improve the physical efficiency of players, but the only obstacle is how to control and quantify the physical effort in this type of preparation, and from this we ask the next question:

What is the closest method between measuring the maximum heartbeat of the Polar device with the heartbeat delivered by the RPE to quantify the training load to quantify the sport load during the specified typical small-games:3 vs 3 by Dellal Alexandre & al, 4 vs 4 by Frank Legall, 8 vs 8 by Drust & Jones.

Then we tested the hypothesis saying the maximum heartbeat method of the Polar device with the heartbeat delivered by RPE in favor of the maximum heartbeat of the Polar Device, during the small-sided game 3 vs 3 proposed by a specific model of Alexandre Dellal & al)

In addition, the second hypothesis saying that there are statistically significant differences between using the maximum heartbeat method of the Polar device with the heartbeat delivered by RPE, in favor of the maximum heartbeat of the Polar Device, during the suggested 4vs4 small-sided game from a specific model by (Frank Legall).

Moreover, for the third hypothesis we said, there are statistically significant differences between using the maximum heartbeat method of the Polar device with the heartbeat delivered by RPE in favor of the maximum heartbeat of the Polar Device, during the small-sided game the 8vs8 Small-sided football games proposed by a specific model by (Jones & Drust).

II. Method and Materials

This study is through its results a tool to control the training load during the small-sided-games and the integrated training, as a prelude to the study a questionnaire was distributed to trainers and physical attendants on the basis of a survey study to identify the possibility of applying the study in the field and facilitate work where it was very directed to our field work in terms of Planning and choosing small-sided-games.

We find that each phenomenon has an approach that is appropriate to the nature of its idea and its path. For this reason, the researcher relied on the experimental approach to its suitability and the nature of the study.

2.1. Participants

The research sample consisted of 18 players, out of a total of 500 players active at the level of 20 clubs in the professional first division, Prince Mohammed bin Salman, and the sample was chosen using the intentional method.

2.2. Materials

This study relied on a set of references, the Polar team pro was used to obtain heartbeat and distance covered during the application of Small-sided soccer games and after the end of each small sided-games 3vs3, 4vs4, 8vs8, we asked the players about their (RPE), Rating of Perceived Exertion using numbers as an arbitrary unit.

2.3. Design and Procedure

Research fields:

Spatial domain: Saudi Gulf Club Stadium, Saudi Arabia, Dammam.

Timeline: The study spanned 3 months during the 2018/2019 football season.

The human sphere: Represented in 18 players from the Prince Mohamed ben Salman League.

2.4. Statistical Analysis

Reliance was made in analyzing the results statistically on linear correlation; test Student and Spss statistical program was used.

III. Results

As shown in Table 1, the mean scores of experimental and control variables are nearly the same, indicating equality, regarding their knowledge of targeted structures.

Table 1. Calculating the Polar, RPE, and Variables Measurement Calculation by Applying Repetitive Measurement Test for ANOVA Using SPSS.

Method		Averages difference	Standard error	Indication	Field of trust	
					Upper bound	Lower bound
Polar	RPE	18,759*	1,907	0,000	13,697	23,821
	Modèle	5,315*	1,348	0,003	1,736	8,894
RPE	Polar	-18,759*	1,907	0,000	-23,821	-13,697
	Modèle	-13,444*	1,661	0,000	-17,855	-9,034
Modèle	Polar	-5,315*	1,348	0,003	-8,894	-1,736
	RPE	13,444*	1,661	0,000	9,034	17,855

Table discussions:

From the last two lines of the previous table, it is clearly evident that the method of measuring the maximum heartbeat is closer to the method of heartbeat delivered by RPE to the method proposed from the model where we recorded a value of 5,315 for the positive difference between the first method and the typical method which is greater than the value of 13,444 for the positive difference between the method. The second and the typical method, and therefore there are statistically significant differences between the use of the maximum heartbeat method for the polar device and the heart beat delivered by RPE and the proposed method of the model in favor of the maximum heartbeat of the polar device, to quantify the taining load during

the specified typical small-sided football games: 3vs3 by “Alexandre Dellal & al” , 4vs 4 by Frank Legall , 8vs 8 by “ Jones & Drust”

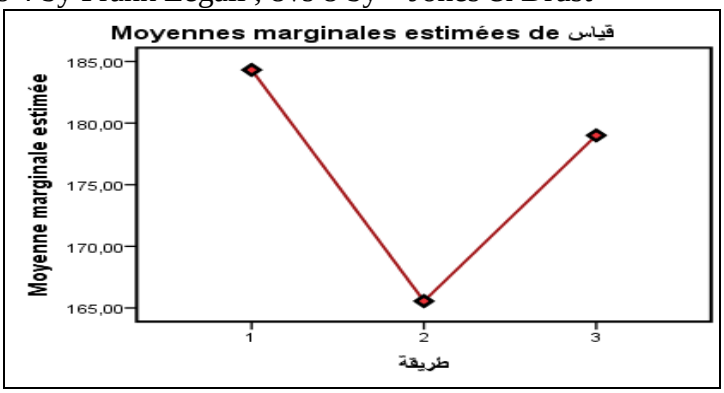

Figure 1. Showing distances between the three averages estimated marginal averages.

We note that the level of significance of the differences between the two methods of measuring the maximum heartbeat and heartbeat ladder RPE is 0,000 which is a value lower than the level of significance of the test which is 0.05, then we reject the zero hypothesis and accept the alternative hypothesis that the differences between the two methods are statistically significant while we note that the level of significance The differences between the two maximum heart rate measurements and the proposed method of the model were 0.003.

And It is a value less than the significance level for the test, which is equal to 0.05, so we reject the zero hypothesis and accept the alternative hypothesis that the differences between the two methods are statistically significant, while we note that the level of significance of the differences between the two methods of measuring the heart rate delivered by RPE and the proposed method of the model is 0.000 which is A value less than the test significance level of 0.05, so we reject the null hypothesis and accept the alternative hypothesis that the differences between the two methods are statistically significant.

Therefore, there are statistically significant differences between the three methods to quantify athletic load during typical Small-sided soccer games at a level of significance of 0.05.

IV. Discussion

It is clear from the previous results that there are statistically significant differences between the linear correlation coefficients calculated for each of the games 3vs3 and 8vs8 in favor of both the maximum heart rate of the Polar device (the significance level is less than 0.05), the previous study from Alexander Dellal, aimed to compare the cardiac responses during exercises with controlled physical loads (intermittent exercises for short runs) and during integrated physical exercises (small-sided games) in high-level. First, hypothesized that cardiac responses were similar between certain soccer-specific intermittent exercises and certain small-sided games, he then tested the hypothesis that between-subject's homogeneity of the hr was less important during reduced games compared to intermittent exercises, the small sided-game model 3vs3 from Alexander Dellal study shows less important regarding the physiological impact of reduced games because the playing conditions were not similar and the level of motivation was difficult to control, but other study from jones and drust entitled physiological and technical demands of 4vs4 and 8vs8 games in elite youth soccer players show us that The mean ± sd heart rate responses for the 4vs4 and the 8vs8 small-sided games, the Mean heart rate responses for the 4vs4 games was 175±10 beats/min. This value was not significantly different from the mean value observed in the 8vs8 games (168±6 beats/min). The percentage time spent in each heart rate zone was also similar between the two types of games ($P > 0.05$), that confirme the results of our study
while there are no Statistically significant differences between the linear correlation coefficients calculated for game 4 vs 4 (the significance level is greater than 0.05), we conclude that the maximum heart rate method of the Polar heartbeat is considered the most effective way to quantify training load during typical small-sided soccer games.
It is evident from the analysis of the results that the method of measuring the maximum heart rate is closer to the method of the heart beat delivered by the RPE to the method proposed by the model to quantify the sporting load.

V. Conclusion

This study started from the problem of knowing the method that is closest to quantizing the training load and under the title of «comparative study between two methods of training load quantification through small-sided games in soccer.

Our objective was to Identify if there are differences between the use of the maximum heartbeat method of the Polar device with the heartbeat delivered by RPE, during the proposed Small-sided soccer game from a specific model 3 vs 3 by Dellal Alexandre & al, 4 vs 4 by Frank Legall, 8 vs 8 by Drust & Jones also to know if ladder with RPE helps to quantify the load during the small-sided games.

What is the closest method between measuring the maximum heartbeat of the Polar device with the heartbeat delivered by the RPE to quantify the training load to quantify the sport load during the specified typical small-games: 3 vs 3 by Dellal Alexandre & al, 4 vs 4 by Frank Legall, 8 vs 8 by Drust & Jones.

As a temporary answer, we formulated a general hypothesis, the main hypothesis stems from the use of the maximum heart rate measurement of the Polar device with the heartbeat delivered by RPE to quantify the training load during the specified typical small-sided soccer games: 3 vs 3 by Alexandre Dellal & al, 4 vs 4 by Frank Legall, 8 vs 8 by Drust & Jones.

It also turns out that the method (Polar maximum heart rate is closer to to quantify the training load during the typical 3vs3 small-sided soccer games, we notice that for Alxandre Dellal & all in his last study, "Through our contact with the athletic field and our observation that players perform hard physical characteristics during small-sided soccer games, this is what the spirit of research has found in us. We found that there are many different factors that affect physical performance. Performance is one of the most important physiological foundations of movement performance, and the physically empowered athlete is the one who Control the performance of his movements masterfully and effortlessly, the most important of these factors that affect physical performance are the physiological variables that have a major impact on athletes. We, through our studies, try to study these factors and the relationship of physiology applied in soccerl through researching its relationship to physical performance and its relationship to quantify load during small-sided soccer games at Football players. "

We also resorted to the decision to accept the second practical hypothesis which says that there are statistically significant differences between the use of the maximum heartbeat method of the polar device with the heartbeat delivered by RPE in favor of the maximum heartbeat of the Polar device, During the 4vs4 small-sided football game proposed by a specific model by (Frank Legall).

To ensure the validity or negation of the third practical hypothesis, which states that there are statistically significant differences between the use of the maximum heartbeat method of the polar device with the heartbeat delivered by RPE ladder in favor of the maximum heartbeat of the Polar device during the 8vs8 small-sided soccer games proposed by a specific model by (Drust & Jones).

By comparing the results using contrast and correlation to see whether there are differences between the studied variables, we confirmed the validity of the first, second, and third partial hypotheses and the achievement of the main hypothesis and the results indicate a greater consistency with the maximum heart rate of the Polar device.

Despite the multiplicity of research in foreign countries, it remains very small in our country. It has been confirmed that the use of physiological partcularities and small-sided-games and their quantization in soccer in foreign countries, especially the use of huge logistical informatics and very advanced technology where the major European teams did not win the world titles by chance. We can say that this is the secret of their success. The fact that these teams use modern technological devices such as the Polar Team Pro is a simple example.

So the time has come to develop mathematical results with more attention in this field in our country until we come to apply them in the economic and social field, and to carry out more exciting scientific research and field studies.

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