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A comparative of the maximum aerobic speed MAS among handball players of the excellent division , according to the playing positions

دراسة مقارنة لخاصية السرعة الهوائية القصوى VMA للاعبي كرة اليد للقسم الممتاز أكابر حسب مراكز اللعب

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Abstract: The study aimed to identify the differences in the maximal aerobic speed(MAS) between the handball players of the excellent Division by playing positions in order to answer the question of whether there is statistically significant differences in the maximal aerobic speed (MAS) between the handball players of the excellent division by playing positions? We have assumed that there are statistically significant differences in the (MAS) between the handball players of the excellent division by playing position, we have adopted in our study the descriptive approach appropriate to the nature of the topic, Applied to a sample consisted of 44 players from the excellent division the sample chosen by Stratified random and we used the 30-15 IFT Martin Buchheit test as a tool after making sure of the scientific foundations of validity, reliability and objectivity. After the statistical treatment we reach to that there are no differences in the maximal aerobic speed(MAS) between the handball players of the excellent division by playing positions.

Key Words:: maximal aerobic speed (MAS), playing position , handball

الملخص : هدفت الدراسة إلى التعرف على الفروق في خاصية السرعة الهوائية القصوى (VMA) بين لاعبي كرة اليد للقسم الممتاز أكابر حسب مراكز اللعب بغرض الإجابة على السؤال المطروح المتمثل في هل توجد فروق ذات دلالة إحصائية في خاصية السرعة الهوائية القصوى (VMA) بين لاعبي كرة اليد للقسم الممتاز أكابر حسب مراكز اللعب؟ وقد افترضنا أنه توجد فروق ذات دلالة إحصائية في خاصية السرعة الهوائية القصوى (VMA) بين لاعبي كرة اليد للقسم الممتاز أكابر حسب مراكز اللعب، اعتمدنا في دراستنا المنهج الوصفي الملائم لطبيعة الموضوع على عينة تكونت من 44 لاعبا من القسم الممتاز اختيرت بالطريقة العشوائية الطبقية واستخدمنا اختبار 30-15 IFT لقياس السرعة الهوائية القصوى لصاحبه مارتن بوشيت Martin Buchheit كأداة للبحث بعد التأكد من أسسه العلمية من صدق، ثبات

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وموضوعية، وبعد المعالجة الإحصائية توصلنا إلى أنه لا توجد فروق في خاصية السرعة الهوائية القصوى (VMA) بين لاعبي كرة اليد للقسم الممتاز الجزائري أكابر حسب مراكز اللعب.

- **الكلمات المفتاحية:** السرعة الهوائية القصوى (VMA)، مرا كز اللعب ، كرة اليد.

Theoretical chapter:

1- Introduction and problematic of the research:

The development of the global handball game and its degree in scientific and practical competition between training schools, which resulted in high performance at the level of skill, as some large international teams reached the limit of integration in performance, and this is what led those training schools to exceed the limits of technical and skill competition As it directed its training methods towards developing the general physical characteristics of the handball player in a way that serves the technical side, as these qualities have developed to a very high level, and the development in the effectiveness of handball globally has directed researchers and coaches to pay attention to developing the physical characteristics and their impact on handball players.

Competition in handball has also been characterized by a series of movements represented by fast running, jumping and throwing, as these exercises merge according to different energy mechanisms, including aerobic and anaerobic, through the succession of multiple periods in the effort and rest in the handball match, as the rest of the body's systems bear Another burden is the direction of response to performance requirements, which is the ability of the voluntary muscle to consume. Oxygen **(Darwish, 18,1998).**

Bayer (1993) also referred to a study conducted on a handball match for the first division, and found that "the overall playing rate is 48 minutes and an average of 12 seconds for periods of effort exertion, with an oxygen

consumption value ranging between 82-90% of the maximum oxygen consumed." (VO2max **(Bayer,1993, 313).**

The maximum aerobic speed is one of the most important factors for athletic success in endurance activities, as it is the maximum ability of the athlete's body to transport and consume oxygen. From this basis, the coach must work on his training.

Nofal et al. (2007) also indicated that the handball event is played with major playing positions and the duties of the players in these positions vary and differ from one position to another, this led to the difference in the effort exerted and this requires the coaches to focus during the training process on these positions and their requirements, so that he can codify the training loads according to the different playing positions Knowing these differences helps coaches to improve and develop the level of players of these positions , which is the main pillar in the team's technique and tactics, and this pushed for good results that serve the handball effectiveness.

Hence the importance of research and the need to study the differences between the different playing positions in this element and to raise the level of effectiveness and develop them, and this is what encouraged us to choose this topic, perhaps it contributes even a little bit to enriching the field, which contributes to improving the quality of training.In the light of the foregoing, the researchers proposed this study whose problem is determined as follows:

Are there statistically significant differences in the maximum aerobic speed characteristic (MAS) between handball players for the excellent division according to the playing positions?

2-Hypothese of the research :

Accordingly, the researchers assumed that there were statistically significant differences in the maximum aerobic speed characteristic (MAS) between the handball players of the excellent division according to the playing positions.

3-The target of the research:

-identify the level of the players of the excellent division in the feature of maximum air speed.

-identify the differences in the maximum aerobic speed feature (MAS) for handball players for the excellent division , according to the playing positions.

4-Importance of the research: it is evident that it is useful in revealing the importance of qualitative specialized training for handball players according to play positions.

The study also contributes to defining physical requirements for handball by playing positions to contribute to giving trainers a glimpse of the specifics of each play position in order to guide players according to their capabilities Physical.

5-The main search terms were:

5-1 Maximum aerobic speed (MAS): It is the speed gained by the athlete when his oxygen consumption is at its maximum. We can find it between 08 km / h - 24 km / h.

5-2Handball: Handball is a team sport that is characterized by making various movements such as fast running, jumping and aiming ... etc. It is considered one of the sports that falls within the scope of the succession of periods of high intensity. Play with six players plus a goalkeeper inside a standardized stadium, where players attack the opponent's area with the ball to score the goal as defenders repel the escalation of the ball with the intention of trying to

retrieve the ball or defend the goal, where this game is practiced by hands in the framework of respecting the general law, the team recorded for the largest number of goals is the winner in the game.

5-3 Playing positions: The places that players take on the stadium and through which they perform their planning duties, whether defensive or offensive the playing positions: is defined as the location that determines the role of the player in the integrated construction of the team players, through which he executes his offensive and defensive duties within the framework of the plans laid down.

6- Review Of The Related

No scientific research can be completed without the use of previous or related studies, as the latter provides assistance and support to the researcher in order to find out the most important findings of the research carried out in the same field of the research subject.

6-1 Study of Mahor Pasha Sabira, PhD Thesis - University of Algiers - entitled Indicators of Morphological and Physical Development of Young Handball Players by Playing positions (2012).The study aimed to shed light on the extent of morphological and physical differences between handball players (15-17 years) according to the playing positions. The researcher posed the following problem: What is the typical profile of the morphological and physical development of handball players (15-17 years) according to the playing positions? The researcher assumed the possibility of a morphological and physical specificity associated with the playing positions. The researcher

conducted the study on a sample of 335 handball players in the age group (15-17) years, taken from different regions of the country. The researcher concluded:

• The back players scored the best results in the level of vertical and horizontal uplift tests in the ball throw test and flexibility, and medium to below average results in the speed tests.

• The playmakers do well in speed tests.

• The wing players scored average to below average in the endurance speed test. In contrast, the goalkeepers showed the best results in the endurance test, the lowest in the vertical and horizontal rise, and average results in the rest of the tests.

2-6 Study of *B. Chittibabu* Annamalai University (2014) - India - entitled: Comparison of the ability to run repeatedly and the fatigue index of handball players according to different playing positions.

The intention of this study was to compare the ability of frequent running and fatigue index among male handball players according to different playing positions. The sample consisted of thirty-two (32) male handball players from the Department of Physical Education and Sports Sciences, Annamalai University, Tamil Nadu, India. These players were classified into four groups: backs (12), wings (7), pivots (7) and goalkeepers (6) respectively. This selected sample is of those who practice handball regularly and participate in the competition. Average life expectancy: 21.62 ± 1.90 years; Weight: 64.59 ± 7.25 kg and height: 172.07 ± 7.25 cm .. The repeated running ability and fatigue index were chosen as the search variables.

To assess the repetitive sprint ability and fatigue index, all members of the sample ran the running race protocols, which consisted of 7 x 30m with 25 seconds rest. Total running time was calculated by summing into seven repetitions and the fatigue index of sprint times was calculated using the followingformulas:

Fatigue Index = {(slowest race - fastest race) / fastest race} X 100 The data collected was analyzed. Using single analysis of variance (ANOVA).

The results showed a big difference between male handball players in different playing centers. The combination of speed performance and fatigue index times are best for wingers and worst for goalkeepers.

6.3 Study of Elias, Panagiotis and Demetrius, University of Athens (2009). The aim of the present study was to define and evaluate the differences in physical fitness and anthropometric characteristics between the playing positions in young female team handball players. The sample consisted of 181 female young handball players with the mean age of 14.12±1.09 yrs, and 3.41±1.67 yrs of playing experience. Body height, body mass, body mass index, arm span, palm length and opening, standing long jump, 30m sprint, sit and reach flexibility and estimated VO2max were measured and throwing speed was assessed with a radar gun.

Significant differences were detected among individual positions for height (p<0.001), body mass(p<0.001), BMI (p<0.001), arm span (p<0.001), palm opening (p<0.001), palm length (p<0.001), broad jump (p<0.001), ball throwing velocity (p<0.001), 30-m sprint (p<0.001) and estimated VO2max(p<0.001).

Back players were the tallest, with the largest arm span, palm opening and palm length.

Wing players were the shortest, with the least weight, the lowest BMI and the smallest palm opening and palm length among all players. Wings showed better performance than all other players in broad jump, 30-m sprint and VO2max. Back players achieved the highest values among all players in ball throwing speed, while goalkeepers' were the lowest. Goalkeepers underperformed in relation to all motor abilities compared to all other playing positions.

The practical chapter

1- **Followed Methodologies:** Based on the problem of the study، which seeks to know the differences in the characteristic of the maximum aerobic speed (MAS) between the handball players of the excellent division according to the playing positions, the **descriptive** approach is the most suitable curriculum for this study.

2- Community and sample: The research community consists of handball players, the excellent section in the eastern part of the country Season 2014/2015, which consists of (6) teams, namely:

Table -1 - shows the search community

Club	The label
Mostakbal Baladia Tedjnent	MBT
Chabiba Amel Skikda	JSES
Chabab Riadhi Baladia Mila	CRBM
Nadjm Ain Touta	ESAT
Chabab Borj Bou Araridj	CRBBA
Hilal Chelghoum Laid	CCL

The research sample: The research sample consisted of 3 teams in the excellent division, the eastern side of the country, and it represents 50% of the research community .

Table No. -2-shows the distribution of the research sample according to the difference clubs.

The club		number of players
01	CRBM	16
02	CCL	15
03	MBT	13
Total		44

Table No. -3- shows the distribution of the research sample according to the playing position

Clubs		Number of players, according to the playing positions					Total
		G.keeper	back	playmaker	pivot	wing	
01	CRBM	02	03	03	04	04	16
02	CCL	05	01	02	04	03	15
03	MBT	03	04	01	02	03	13
TOTAL		12	09	06	09	08	44
The ratio %		27.27	20.45	13.63	20.45	18.18	100

3-Search Tools:

The researchers has relied for the purpose of data collection on:

IFT 15-30 test to measure the maximum aerobic speed of its owner « **Martin**

Boucheit »

IFT 30-15 (Martin Boucheit) :

Objective: to measure the maximum aerobic speed (MAS)

Means used:

• Computer.

• Amplifier.

• Voice recording for IFT 30-30.

Test procedures :

- The audio recording of the test contains two types of signals single and double signals

- The player kicks off at the first signal, and at every single signal he must have a distance of 20 meters ± 3 meters, and stops running at the double signal so that he has achieved the level.

- At the next single signal, the next level starts with the same way.

- The test ends with the withdrawal of the player or his inability to reach the required distance three times, and the level at which he stopped is the maximum aerobic speed calculated in km / h

4- Scientific factors for the test:

Test Validity: To verify the validity of the test, test author Martin Buchheit compared the VO2max obtained (IFT) 30- 15 with VO2max for the same sample measured in the laboratory on a mobile mat for: 60 handball players (36 femal and 24 male with an average age of B: 16.4 ± 1.3 years

The figure shows the value of the V02max calculated by the 15-30 IFT test

compared to the calculated value in the laboratory for the same year. The correlation coefficient between the expected values and the measured values is 0.82.

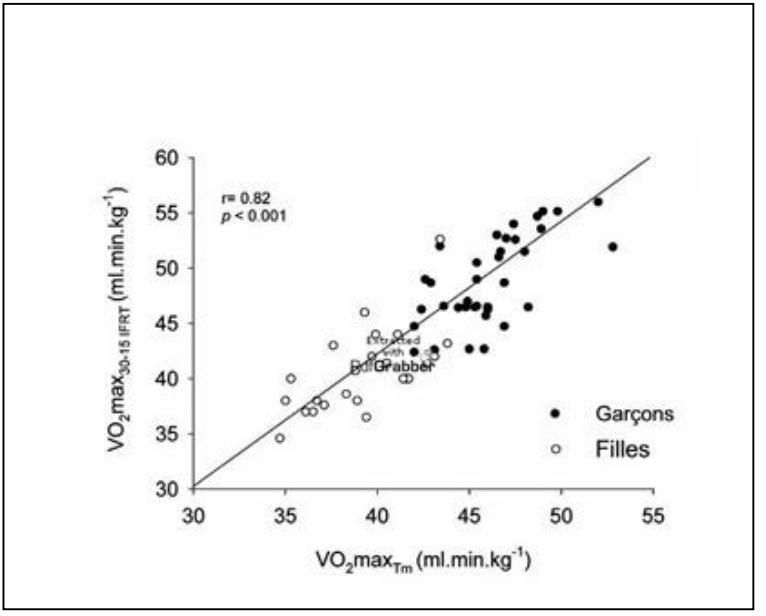

Figure -1- Shows the comparison of VO2 MAX measured in the laboratory with VO2 MAX measured by IFT 30-15.

• **Test Stability**: To measure the stability of the test, the test creator performed the test and retested on 19 athletes (9 females and 10 males), average age 19.4 ± 1.8 years, and compared the values of MAS VO2max, maximum heart rate and the maximum concentration of lactate in the blood obtained In the two tests, the maximum aerobic speed value, the maximum number of pulses and the acid concentration in the blood for the two tests were identical.

Table No.-4-illustrates the stability of IFT 30-15

	The first test	The second test
MAS	0.7 ± 20.1	0.9± 20.2
HEART RATE	2.3 ± 196	3.1 ± 195
VO2max	1.3 ± 11.8	1.9 ± 12.0

The correlation coefficient between the values of the two tests is greater than **0.96**, so the test has a high degree of stability .

Test objectivity: To test the objectivity of the test, the test creator conducted a comparative study between IFT 30-15 and two of the most popular field tests, On-Line Continuous Testing by: Leger et al. From the University of Montreal (UM-TT) (14) and continuous testing going and forth by: Leger et al. (20m SRT). These comparisons were presented in two ways:

We first looked at the relationship between the maximum velocity test obtained in the MAS test and physical attributes considered as performance determinants of team sports (muscular explosive traits) among 173 athletes (girls = 68; = 105 males, mean age 17.8 ± 2.1) and on the other hand we measured (PP) for testing and comparison with classical field tests UM-TT and 20Msrt in 325 athletes (female = 132; male = 193; average age 17.9 ± 1.4 years).

The results of the test creator showed that the running speed reached during the « 30-15 test especially with the explosive index was closely related with VO2max.

This great association between VMA and explosive traits is also great with running speed

Correlation obtained during IFT 30-30 test where p = 0.73, p <0.001)) compared to other classical tests where (p = 0.52) with respect to UM-TT test and p = 0.62 for 20mSRT test

Finally, the examiner noted That he verified that this relationship was not affected by the age factor (2005, 31, Martin Buchheit)

5- Field procedures of the study:

After confirming the validity and consistency of the study tool, we conducted the study on the sample consisting of (44) players from the excellent division of the ball in each of theCRB Mila, C**C**halgoum LAID and MB TadJnant, where the test was conducted on the sample members and then recorded the results in its card, Then the results were examined and tabulated in SPSS tables.

6- Statistical methods:

The researchers analyzed using the SPSS 20 statistical package to identify the following statistical values:

- Arithmetic mean SMA.
- Standard deviation.
- Coefficient of variation.
- ANOVA mono-variance analysis.
- TUKEY Sincere Teams Test.

7- Presentation and discussion of the results:

7-1 View and discuss the results of the hypothesis:

The researchers assumed that there were statistically significant differences in the maximum aerobic speed (MAS) between the handball players of the

excellent division according to the playing positions.

7-2 Display the test results for the research sample according to the playing position

7-2-1 Display test results for goalkeepers

Table No. 5 - Shows test results for goalkeepers

Test / Statistics	MAS
Arithmetic mean	15,78
standard deviation	1,12
The maximum value	17,50
Minimum value	14,00
Coefficient of variation	7,11

The arithmetic mean of the maximum aerobic speed of the goalkeepers was **15.78** km / h, with a deviation of ± **1.12** km / h, with a maximum value of **17.50** km / h, and a minimum value of 14,00 km / h, with a different coefficient of **7.11**%, which indicates On the great homogeneity between the elements of the research sample.

7-2-2 Display the results of the physical test for the wings :

Table No. 6-represents the test results for the wings :

Test / Statistics	MAS
Arithmetic mean	16,04
standard deviation	1,08
The maximum value	17,50
Minimum value	14,50
Coefficient of variation	6,71

- The The arithmetic mean of the maximum aerobic speed of the wings is **16.04** km / h, with a deviation of ± **1.08** km / h, with a maximum value of **17.50** km / h, and a minimum value of **14.50** km / h, with a difference factor **of 6.71**%, which indicates On the great homogeneity between the elements of the research sample.

7-2-3 Display test results for backs

Table No. 7 - Shows test results for backs

Test / Statistics	MAS
Arithmetic mean	16,22
standard deviation	0,97
The maximum value	17,50
Minimum value	14,50
Coefficient of variation	5,99

The arithmetic mean of the maximum aerobic speed of the backs reached **16,22** km / h, with a deviation of ± **0,97**km / h, with a maximum value of **17.50** km / h,

and a minimum value of **14,50** km / h, with a different coefficient of **5.99** %, which indicates On the great homogeneity between the elements of the research sample.

7-2-4 Show test results for the pivots :

Table No. -8 represents the test results for the two pivot

Test / Statistics	MAS
Arithmetic mean	15,78
standard deviation	1,12
The maximum value	17,50
Minimum value	14,00
Coefficient of variation	7,11

The arithmetic mean of the maximum aerobic speed of the pivots reached **15.78** km / h, with a deviation of ± **1.12** km / h, with a maximum value of **17.50** km / h, and a minimum value of **14,00** km / h, with a different coefficient of **7.11**%, which indicates On the great homogeneity between the elements of the research sample.

7-2-4 Display test results to play makers:

Table No.-9-represents the test results for play makers

Test / Statistics	MAS
Arithmetic mean	16,42
standard deviation	0,58
The maximum value	17,00
Minimum value	15,50
Coefficient of variation	3,56

The arithmetic mean of aerobic speed for playmkers is **16,42** km / h, with a deviation of ± **0.58** km / h, with a maximum value of **17,00** km / h, and a minimum value of **15,50** km / h, with a difference of 3.56%, indicating The great homogeneity between the elements of the research sample .

7-3 Show the comparison of the results of the IFT test for the maximum aerobic speed between the elements of the research sample by playing positions

Table No. -10- shows a comparison of the results of the maximum aerobic speed test between the elements of the research sample according to the playing positions

Playing position	MAS	
keepers	Arithmetic mean	15,69
	standard deviation	1,03
winds	Arithmetic mean	16,04
	standard deviation	1,08
backs	Arithmetic mean	16,22
	standard deviation	0,97
pivots	Arithmetic mean	15,78
	standard deviation	1,12
playmakers	Arithmetic mean	16,42
	standard deviation	0,58
Analysis of variance	**not statistically significant**	

* Significant at 0.05 ** Significant at 0.01 *** Significant at 0.001

Analysis of variance showed no differences between the elements of the research sample at the significance level 0.01 .

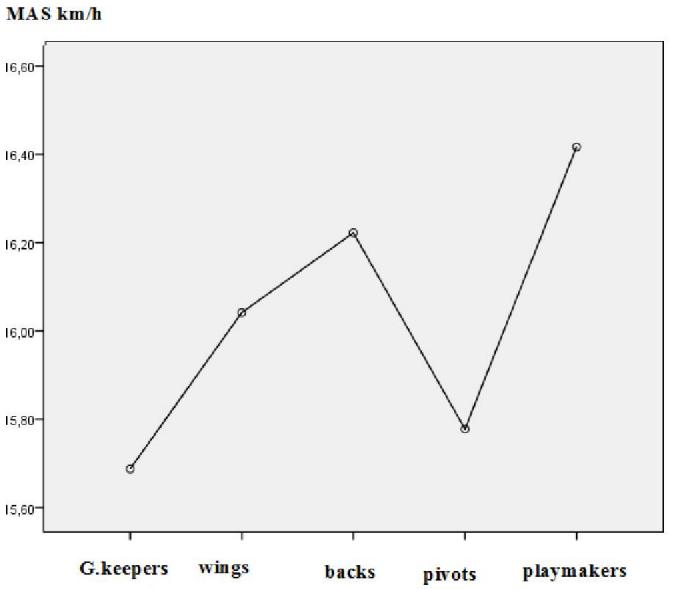

Figure No. 2- shows the results of the MAS test between the elements of the research sample, according to the playing position

Mono-variance analysis of the maximum aerobic speed test MAS between the elements of the research sample by playing positions showed no statistically significant differences between play positions

7 -4 Display the profile of the research sample elements according to the test results :

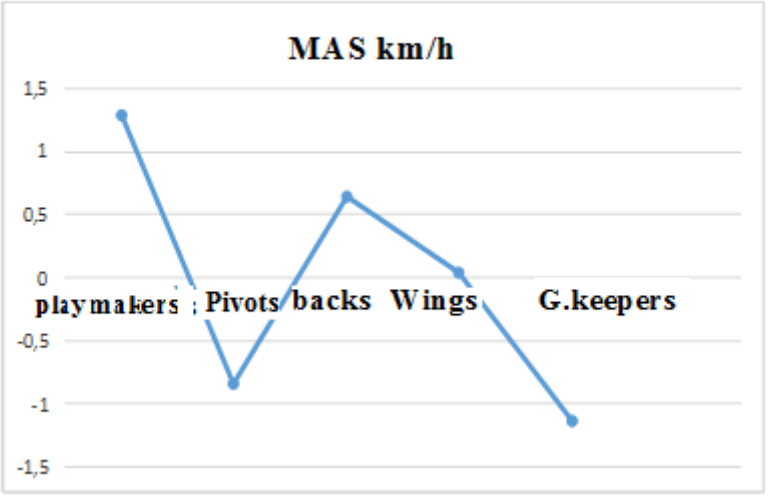

Figure -3- shows the profile of the sample elements according to the test results.

From Figure No. 3, the profile of the research sample elements are clear, as:

-Goalkeepers achieved the weakest results in the MAS maximum aerobic speed test.

-Wings Score Good Results for MAS.

-Backs achieved good results in the MAS test .

-Pivots scored below average on the MAS.

-As for the play makers' position, they scored the best results in the MAS test .

7-5 Analyze and discuss the results related to the hypothesis:

Depending on the results of Table 10, which shows a comparison of the results of the maximum aerobic speed test MAS between the elements of the

research sample by the playing positions, the mono-variance analysis test for the maximum aerobic speed test MAS between the elements of the research sample according to the play position showed **no statistically significant differences between the playing positions.**

Thus the hypothesis that:

There are statistically significant no differences in the maximum aerobic speed (MAS) between handball players of the exellent Division, according to the playing positions.

This result is inconsistent with the study of **Elias and others**, which showed a statistically significant difference between the wings ,the goalkeepers and pivots in the amount of maximum oxygen consumption VO2 MAX, which was also the conclusion of the study of **Nawfal Muhammad Mahmoud Al-Hayali** and **Zaini Mashku Hajji Al-Haraki** , as indicated by the study of **Chitababu** University of Anamalai in India that I compared the ability to run repeatedly and the fatigue index of handball players according to different play positions. The results showed a big difference between male handball players in different play positions. The sum of the speed performance times and the fatigue index are the best for the wingers and the worst for the goalkeepers, as did **the Mahoor Pasha Sabra** study, which showed the goalkeeper's superiority in the endurance property over the rest of the positions. So the hypothesis was not achieved,

8- General conclusion:

In light of the results of the study within the sample limits and in the framework of the statistical treatment used, the researchers reached the

following:

- There are no statistically significant differences in the characteristic of the maximum aerobic speed (MAS) between the handball players of the excellent division, according to the playing positions, a result that contradicts in return to previous references and studies.

9- Suggestions and recommendations:

By the end of the study, and given the conclusions reached within the framework of the study, the researchers suggests the following:

- Sports clubs and coaches should benefit from the research conducted on handball and all sports players.
- Emphasizing the importance of conducting physical examinations on a regular basis to determine the level of players and assessing the training path.
- Accreditation of test results for planning training programs.
- Handball coaches should pay attention to the different playing positions, each according to the nature of his performance. And the privacy of these positions while planning training.
-Giving the necessary importance to the characteristics of aerobic capabilities during training planning because of their impact on deciding the results of the competition.

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