

The Annals of the “Ștefan cel Mare” University of Suceava.
Physical Education and Sport Section. The Science and Art of Movement
eISSN 2601 - 341X, ISSN 1844-9131 Volum XV issue 2/ 2022

**COMPARATIVE STUDY REGARDING THE CONNECTION BETWEEN
THE EFFORT CAPACITY AND THE DISPLAYED VALUE OF WING
PLAYERS FROM THE ROMANIAN NATIONAL HANDBALL LEAGUE**

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Keywords : handball, male, wings, comparisson, effort capacity

Abstract

The purpose of this article is to determine whether there is a link between the effort capacity and the generally recognized value at national level in the case of performance athletes specialized as wing in the Romanian National Men's Handball League. The sample of participants consisted of 20 male players divided into two groups. The first group included 16 wings (n=16) who participate in the first handball league and the second group included four wing players (n=4), which play for Dinamo Bucharest Sports Club. In order to assess the effort capacity, we chose to use the Gacon test, which has a high degree of applicability at the level of performance handball, oriented towards the evaluation of the intermittent running skills of the athlete. Analyzing the performances obtained, we notice that at the level of the National League of Men's Handball, the effort level presents us with an average of 18.68 ± 3.66 with a variability coefficient of 19.61% located on the threshold of average homogeneity and the values obtained by the players specialized as wings that play for Dinamo Bucharest Sports Club, indicate an average of 14.75 ± 2.21 , inferior to the group to which they belong, but with the same degree of average homogeneity (15.03%). As a result of the tests carried out, a significant difference is observed between the two groups of subjects when it comes to the distance traveled, the average speed and the aerobic power, but not in terms of heart rate, which indicates that the individual value expressed on the court and generally recognized in the professional handball players specialized as wing is not directly related to their effort capacity.

Introduction

Sport has always been an important part of the life of any society and performance sports since ancient times has attracted the masses through the competitive appearance and physical qualities of practitioners. With the passage of time and the increasing involvement of scientific research in performance sports, athletes involved in sports competitions have displayed better and better physical and technical skills from one generation to another, now reaching the performance

sport to be "a social phenomenon strongly anchored in our current life and more than likely also in the near perspective" (Baștiura,E.,2006, p.11).

Handball, although it appeared in different forms only in the late nineteenth century early twentieth century, became very quickly a highly appreciated sport and practiced due to its spectacularity that derives from the multitude of movements and technical processes. However, there are almost no quarrels that establish what exactly contributes decisively to the generally recognized value of an athlete in the handball game.

The trends of elite handball at international level have preoccupied researchers such as Karass D., Mihăilă I., Ghervan P., (2007), other specialists, among which we mention Bompa T., (2003); Hantău C., (2000); Colibaba –Evuleț D., Bota I., (1998); Negulescu I., (2000), analyzed the requirements from a physical point of view in the performance handball, methodists such as Orănescu C. (2001); Hantău (2000); Mihăilă I., (2013); Ghervan P., (2006); Axinte A., (2007), Ozolin N. G., (1972); Șiclovan I., (1977); Harre D., (1973); Dragnea A., (1996); Nielsen L. , Wolf T., (2011), , focused their studies on the theory and methodology of handball and the technical side, especially the completion of attacks, among others, was treated by Rogulj N., (2000); Vuleta D. et al. (2003); Taborsky F., (2008); Apitz E. et al., (1997); Srhoy Y. et al. (2001); Gruic I. et al. (2006). We have not, however, found studies that make a connection between the generally recognized value of athletes and their physical qualities. Studies such as the one led by Póvoas Susana C. A. together with collaborators show that athletes specialized as wings are those who during a handball game travel the greatest distance in high intensity running. Therefore, we decided to analyze the effort capacity of the wings from Dinamo Bucharest, the athletes considered to be the best in their position at national level, and of other players specialized in the same position in the National Men's Handball League in order to establish what is the connection between the effort capacity of the athletes specialized on the wing position and their regarded value at national level.

Material- Method

Participants

For this experiment we had two groups. The first group included 16 male handball players specialised on the wing position (n=16). They play for different handball clubs in the Romanian first league. The second group included four wing players (n=4) out of the first group, which play for Dinamo Bucharest. The

inclusion criteria were: to be male, to be wing, good health status. Participants gave their consent to use these personal data for scientific purpose and the conduct of this study was approved by the University of Pitești.

Measurements and tests

In order to assess the effort capacity, we chose the G. Gacon Test developed by the teacher who bears its name. It is a variation of the Intermittent Beep test, with a high degree of applicability at the level of performance handball, oriented towards the evaluation of aerobic power (VO₂max) and the athlete's intermittent running ability.

All the athletes took the test in very close conditions so that the results were not influenced by external factors (weather, the condition of the running track, etc.).

Data analyses

For the statistical analysis, we used mean— \bar{X} , standard deviation—SD and coefficient of variability. To render the statistical significance of the differences we used the Student Test. The independent *t test* was calculated to see if the means of the two samples, respectively the group of players from the teams in the National League ($n = 16$) and those from Dinamo Bucharest Sports Club ($n = 4$) differ significantly. The *t value* results were compared with the *t critical* value from the Fisher table. The degree of freedom was $n - 2$; $(16 + 4) - 2 = 18$.

Findings

Analyzing the performances obtained at the Gacon Test, we notice that for the wings playing in National Men's Handball League, the effort level presents us with an average of 18.68 ± 3.66 with a variability coefficient of 19.61% located on the threshold of average homogeneity. The values obtained by the players specialized on the same position that represent Dinamo Bucharest Sports Club, indicate an average of 14.75 ± 2.21 , lower than the group to which they relate, but with the same degree of average homogeneity (15.03%).

Tab. 1. Wings' results - Romanian National Handball League players

Statistical indicator	Effort level	Medium speed (km/h)	Total distance (m)	VO _{2max} (ml/kg/m)	Maximum heart rate (bpm)
X	18,68	18,84	239,97	57	189,56
SD	3,66	1,83	23,82	5,55	10,09
CV	19,61	9,72	9,93	9,74	5,32

Tab. 2. Wings' results - players from Dinamo Bucharest

Statistical indicator	Effort level	Medium speed (km/h)	Total distance (m)	VO _{2max} (ml/kg/m)	Maximum heart rate (bpm)
X	14,75	16,87	214,37	51	181,25
SD	2,21	1,11	14,41	3,46	12,50
CV	15,03	6,57	6,72	6,79	6,90

The independent t-test calculated between the performances of the two groups with a value of 2.74 is higher than the critical "t" for the materiality threshold of $p < 0.05$, which shows that there are significant differences between the two groups in terms of the level of effort reached by the athletes (tab. 3).

Tab. 3. Statistical indicators for effort level

	Gacon test- effort level					
Indicator/group	X	SD	CV	Critical „t”	Calculated „t”	P
National League	18,68	3,66	19,61	2,101	2,74	p<0,05
Dinamo Bucharest	14,75	2,21	15,03			

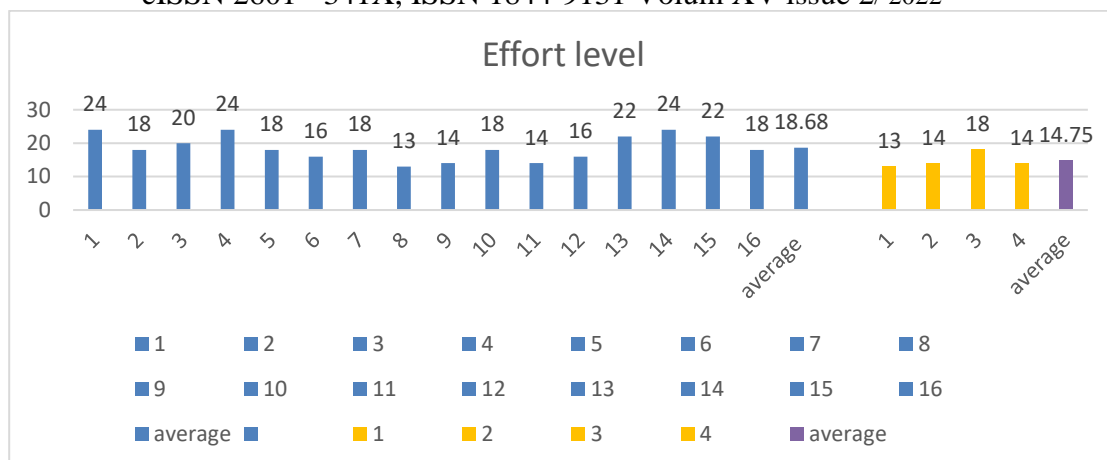


Fig. 1.Effort level for the wing players in Romanian League

The independent "t" test calculated for the medium running speed between the two groups records us the value of 2.73, which frames the differences in the materiality threshold of $p<0.05$, which shows that there are significant differences between the two groups.

Tab. 4.Statistical indicators for medium speed

Indicator/ Group	Gacon test- medium speed					
	X (km/h)	SD (km/h)	CV (%)	critical, „t” $p<0,05$	Calculated „t”	Significance threshold
National League	18,84	1,83	9,72	2,101	2,73	$p<0,05$
Dinamo Bucharest	16,87	1,11	6,57			

The total distance traveled by the players specialized as a winger (n=16) according to the Gacon test assessment grid is 239.97 m, with a standard deviation of ± 23.82 m and a variability coefficient of 9.93% that frames the group in the threshold of high homogeneity. For the sportsmen of Dinamo Bucharest Sports Club, the distance traveled is 214.37m \pm 14.41m with a variability coefficient of 6.72% (high homogeneity). The calculated standalone test value is 2,73 which shows significant differences for the threshold of $p<0,05$.

Tab. 5. Total running distance

Indicator/ Group	Gacon test- total running distance					
	X (km/h)	SD (km/h)	CV (%)	critical, „t” $p<0,05$	Calculated „t”	Significance threshold
National League	239,97	23,82	9,93	2,101	2,73	$p<0,05$
Dinamo Bucharest	214,37	14,41	6,72			

The independent "t" test calculated between the values of the two groups within the maximum volume of oxygen - VO₂max (ml/kg/m) with the value of 2,70 according to the Gacon Test assessment grid, shows us significant differences for the threshold of p<0,05, being fully consistent with the other parameters of the grid.

Tab. 6. Statistical indicators for VO₂max (ml/kg/m)

Gacon test – VO ₂ max						
Indicator/ Group	X (km/h)	SD (km/h)	CV (%)	critical, „t” p<0,05	Calculated „t”	Significance threshold
National League	57	5,55	9,74	2,101	2,70	p<0,05
Dinamo Bucharest	51	3,46	6,79			

The independent "t" test calculated between the performances of the subjects from CS Dinamo Bucharest and the values obtained by the 16 subjects of the National League regarding the heart rate within the Gacon Test, has the value of 1.23 classified in the materiality threshold p>0.05, which shows us that between the two groups there are no statistically significant differences.

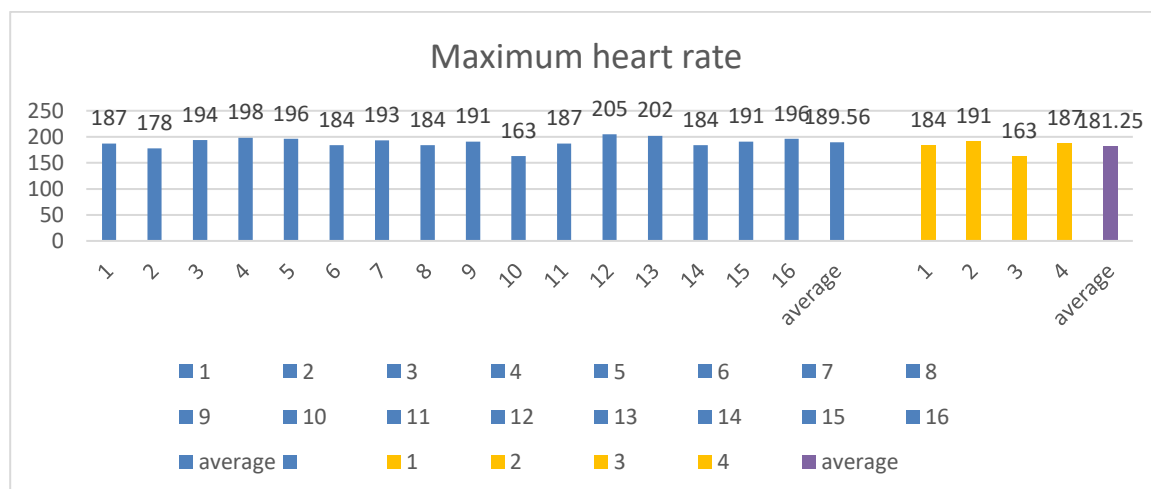


Fig.2. Maximum heart rate (bpm)

Tab. 7. Maximum heart rate

Proba	Testul Gacon – Frecvența cardiacă maximă					
Indicator/ Group	X (km/h)	SD (km/h)	CV (%)	critical, „t” p<0,05	Calculated „t”	Significance threshold

National League	189,56	10,09	5,32	2,101	1,23	p<0,001
Dinamo Bucharest	181,25	12,50	6,90			

Conclusions

The capacity of specific effort at the level of the players specialized in the position of winger working in the national echelon of performance handball, falls within the upper limits of the assessment scales specific to the tests and control tests with a high degree of applicability. We notice a significant difference between the two groups of subjects when it comes to the distance traveled, the average speed of travel and the aerobic power, but not in terms of heart rate, which indicates that the individual value expressed in the field and generally recognized in professional handball players specialized in the position of extreme is not directly related to the effort capacity of the acostora. Taking into account the superior average age of the extremes that play for CS Dinamo Bucharest compared to that of the group of extremes that evolve in the National League of Romania, the results obtained in our testing but also the fact that handball is a collective and very dynamic game where athletes make decisions most of the time in fractions of a second, we conclude that the gaming experience given by the superior number of repetitions of the movements specific to the game station and not only, in conditions of adversity, makes the value of the athletes and the market share to be higher.

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