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Original article

ASPECTS REGARDING THE RELATIONSHIP BETWEEN TECHNICAL TRAINING AND SOMATIC, FUNCTIONAL AND MOTOR PARAMETERS, AT HANDBALL PLAYERS

BAŞTIUREA EUGEN[1], STAN ZENOVIA[1], RIZESCU CONSTANTIN[2]

Abstract

Purpose. The purpose of this study is to observe the influence of somatic, functional and motor parameters upon the game's technique, at senior handball players. On the second place, correlations were made between the somatic and functional parameters and the motor ones.

Methods. The study was performed on 30 athletes aged between 19 and 31 years old (M = 24.2, SD = 3.23). There were applied 31 tests, as follows: technical (30m dribbling among poles, Throwing the ball from distance, Throwing the ball towards the wall and recatching it - version I and II, Throwing the ball at a fixed target - version I and II, Slalom dribbling), somatic (height, wingspan, hand length, thoracic perimeter, chest elasticity, weight), functional (the heart rate, the breathing rate, the vital capacity, the Lorentz resistance index, the Ruffier test, the Sargent test) and motor (5x30m, triangle movement, „the Combined", long jump from a stationary position, detent, penta-jump, abs, 2x400m, 800m, sprint test).

Results. From the 257 correlations between these variables, the value for $r \geq 40\%$ was recorded for 51 of them. The rarest correlations were found between somatic parameters and technical parameters (4), functional parameters and technical parameters (4), but also between functional parameters and motor parameters (3). Most correlations are between technical parameters and motor parameters (30).

Conclusions. The training for developing technical executions is based on improving the motor behavior of athletes that gives them many opportunities to solve unexpected situations that arise during a match. This concept is demonstrated by the close connection between the technical parameters and the motor ones (30 correlations, where **r** has values between 41% and 78%). As the results show, the technical test results are the most influenced by the level of abdominal strength development and speed running, while functional variables have a weak influence on motor and technical skills, in our case. The somatic parameters, although they have an insignificant direct influence on the technique, they manifest more strongly in the case of motor skills. These conclusions should be accepted with care, as it concerns only this group of athletes, while the obtained correlations indicate the degree of association between the used variables and not the cause of those connections.

Keywords: handball, technique, motor skills, somatometry.

Introduction

Handball is an attractive sportive team game with a highly dynamic character and a high degree of accessibility, due to the fact that it is based on a synthesis of basic motor skills such as running, jumping, throwing and relatively simple specific skills (Ghermănescu, Gogâltan, Jianu, Negulescu, 1983; Rizescu, 2000; Hantău, 2002; Mihăilă, 2004). Physical training, along with the tactical, psychological and theoretical one arms the athlete for high intensity moments of the game (Epuran, Holdevici, Toniţa, 2001). The technique provides a high economy and efficiency in the execution of movements. Learning the technique is accomplished in three ways: perceptual-motor learning (sensorimotor), motor learning and intelligent-motor learning (Epuran and Holdevici, 1993; Dragnea, 1993).

The motor aptitudes are underlying the motor abilities, and the last ones in their turn are the essence of the development of technical training (Acsinte and Alexandru, 2000; Rizescu and Ciorbă, 2008; Cicma, 2011). Thus, automating motor actions based on correct learning frees the athlete's attention and allows the athlete to focus its attention on choosing the right tactical decisions (Roman and Batali, 2007; Baştiurea, Stan, Mihăilă, 2013).

For this study, it can be assumed that there is a relationship at a certain level between somatic, functional, motor variables and technical variables in the game of handball.

Methods

Subjects

There were 30 senior handball players aged between 19 and 31 years old (M = 24.2, SD = 3.23) who participated in this study. Please note that all athletes had good health condition to perform the tests correctly and with maximum efficiency.

Testing procedure

[1]Faculty of Physical Education and Sport, University "Dunarea de Jos" from Galati, Romania
[2]Faculty of Physical Education and Sport, University "Ovidius" from Constanta, Romania
CORRESPONDENCE AND REPRINT REQUESTS: Baştiurea Eugen, email: ebastiurea2001@yahoo.com

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The following sets of tests were applied for all athletes, for which, in table 1, there can be found the abbreviations used in the paper:

Table 1. Abbreviations used in the paper

Test	ABBREVIATIONS
Technical training testing (Romanian Handball Federation [FRH], 1998; Baştiurea, 2007)	
30m dribbling among poles	**30 DP**
Throwing the ball from distance	**TBF**
Throwing the ball towards the wall and recatching it - version I and II	**TBT**
Throwing the ball at a fixed target - version I and II	**TBFT**
Slalom dribbling	**SD**
The somatic development testing (Gheorghiu and Olăroiu, 1998; Tarabas, 1999)	
Height	**H**
Wingspan	**WSP**
Length of the hand	**LH**
Thoracic perimeter	**TP**
Chest elasticity	**CE**
Weight	**W**
The functional capacity testing (Gheorghiu and Olăroiu, 1998; Tarabas, 1999; Cordun, 2009)	
The cardiac frequency	**CF**
The breathing frequency	**BF**
The vital capacity	**VC**
The Lorentz resistance index	**LOR**
The Ruffier test	**RUFF**
The Sargent test	**SARG**
Motor training testing (Romanian Handball Federation [FRH], 1998; Baştiurea, 2007)	
5x30m	**5x30**
Triangle movement	**TM**
„The Combined"	**TC**
Long jump from a stationary position	**LSP**
Detent	**DT**
Penta-jump	**PTS**
Abs	**ABS**
2x400m	**2x400**
800m	**800**
Sprint test	**TS**

The description of technical tests

30m dribbling among poles

Seven poles are positioned in a straight line along the handball court (the first pole at a distance of 6m from the start line, the last pole at a distance of 6m before the finish line, and between these two poles, at a 18m distance, the other five poles are placed at a distance of 3m from one another) within a distance of 30m. The athlete must complete this distance motor the ball in a multiple dribbling, among the poles, in slalom. The ball must always be controlled by the athlete, without it being caught or thrown forward. Two runs are executed and the best time is taken into account.

Throwing the ball from distance

The ball (of handball) will be thrown away after executing a three-step dash from behind the line drawn on the ground. This line should not be touched, stepped on or exceeded before the ball is thrown from the pitcher's hand. For the dash, the cross-step or added-step technique will be used. Two attempts are allowed and the best result will be appreciated. The result will be expressed from 50 to 50cm and the obtained values will be more or less rounded.

Throwing the ball towards the wall and recatching it - version I

At the signal, the athlete who is 3m away from a wall, throws the ball towards the wall and recatches it for 1 minute, without it falling on the ground. When time is up, the timer is stopped and the number of passes made by the athletes is recorded.

Throwing the ball towards the wall and recatching it - version II

At the signal, the athlete who is 3m away from a wall executes against time 20 passes towards the wall, without the ball falling on the ground. After completion of the 20 passes, the timer is stopped and the obtained time is recorded.

Throwing the ball at a fixed target - version I

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On a wall, a handball gate is drawn. This has in the four corners, squares with 30cm sides (figure 1). Three meters away from the wall, there is an athlete, who, at the signal, will throw the ball towards the wall and recatch it (the throwing order is from number 1 to 4). The timer will be stopped when the athlete will complete 16 throws (four throws in every corner). Note that during the test, the ball is not allowed to fall on the ground.

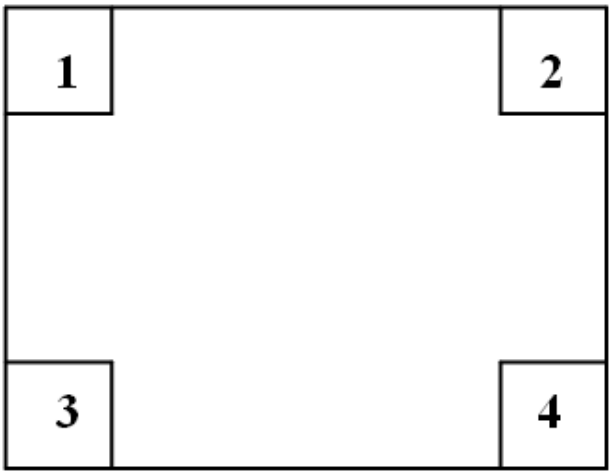

Figure 1. Throwing the ball at a fixed target

Throwing the ball at a fixed target - version II

On a wall, a handball gate is drawn. This has in the four corners, squares with 30cm sides. Three meters away from the wall, there is an athlete, who, at the signal, will throw the ball towards the wall and recatch it for 30 seconds (the throwing order is from number 1 to 4). At the end of the test, the professor records the number of throws executed.

Slalom dribbling

On the ground, a square with 5m sides is drawn. At its' corners, it is marked with poles and in the middle with another pole (figure 2). A full track of multiple dribbling is executed, bypassing the poles in the indicated direction of the arrows. The timer will be started when the athlete begins the test and will be stopped after he crosses the finish line.

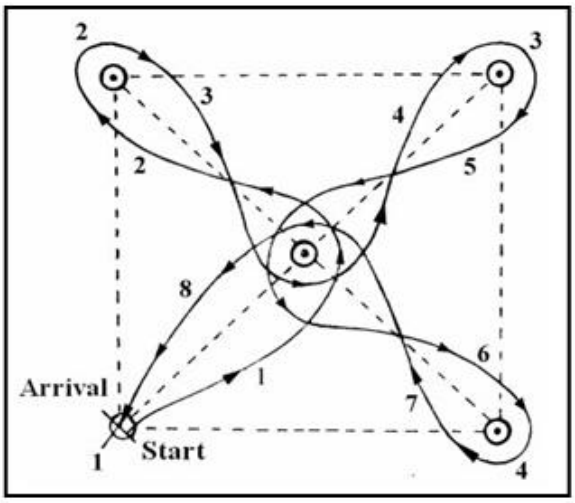

Figure 2. Slalom dribbling

Results

The collected data was processed using SPSS program v. 20 for Windows. A correlation was conducted to examine the relationship between the analyzed variables. From the 257 correlations between these variables, the value for $r \geq 40\%$ was recorded for 51 of them. Confidence coefficient for statistical significance is 95%.

The rarest correlations were found between somatic parameters and technical parameters (4), functional parameters and technical parameters (4), but also between functional parameters and motor parameters (3). Most correlations are between technical parameters and motor parameters (30).

It can be noticed in table 2, the four correlations with values over 40% achieved between somatic parameters and technical parameters.

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Table 2. Correlations made between somatic parameters and technical parameters

	H	W	WSP	CE	LH
30 DP	0.28	0.31	0.26	0.01	0.01
TBF	**0.45**	-0.13	**0.46**	0.24	-0.15
TBT 1	-0.34	-0.33	-0.25	0.02	0.02
TBT 2	**0.41**	0.16	**0.42**	-0.11	0.23
TBFT 1	0.35	0.20	0.34	0.03	0.17
TBFT 2	0.17	-0.22	0.28	0.37	-0.28
SD	0.37	0.22	0.37	0.28	0.13

The values represent the correlation's percentage between somatic parameters and technical parameters; $p<0.05$.

30 DP, 30m dribbling among poles; **TBF**, Throwing the ball from distance; **TBT**, Throwing the ball towards the wall and recatching it - version I and II; **TBFT**, Throwing the ball at a fixed target - version I and II; **SD**, Slalom dribbling; **H**, Height; **W**, Weight; **WSP**, Wingspan; **CE**, Chest elasticity; **LH** – Length of the hand.

The values of correlations between functional parameters and technical parameters are very low (table 3). Only four correlations with values over 40% can be noticed.

Table 3. Correlations made between functional parameters and technical parameters

	CF	BF	VC	RUFF	SARG	LOR
30 DP	0.04	0.03	-0.14	0.01	-0.18	0.03
TBF	0.25	0.34	**0.41**	0.28	**0.43**	**0.42**
TBT 1	0.11	0.13	0.29	0.02	0.31	0.23
TBT 2	0.22	0.10	0.14	0.20	0.17	0.14
TBFT 1	0.02	0.01	0.02	0.02	0.02	0.05
TBFT 2	0.13	0.04	0.39	0.12	**0.40**	0.36
SD	0.21	0.14	0.01	0.18	0.01	0.01

The values represent the correlation's percentage between functional parameters and technical parameters; $p<0.05$.

30 DP, 30m dribbling among poles; **TBF**, Throwing the ball from distance; **TBT**, Throwing the ball towards the wall and recatching it - version I and II; **TBFT**, Throwing the ball at a fixed target - version I and II; **SD**, Slalom dribbling; **CF**, The cardiac frequency; **BF**, The breathing frequency; **VC**, The vital capacity; **RUFF**, The Ruffier test; **SARG**, The Sargent test; **LOR**, The Lorentz resistance index.

In table 4, that includes correlations between the values of the motor parameters and technical parameters, is clearly observed the density of values ≥ 40%. It is thus demonstrated the idea that motor ability is the basis of the perfect technical executions.

Table 4. Correlations made between motor parameters and technical parameters

	DT	5x30	TM	TC	LSP	PTS	ABS	2x400	800	TS
30 DP	0.05	**0.50**	**0.49**	**0.55**	0.04	0.01	**-0.52**	**0.56**	0.36	**0.52**
TBF	**0.44**	**-0.41**	-0.28	-0.21	**0.47**	**0.44**	**0.46**	-0.14	-0.13	0.02
TBT 1	0.01	-0.35	-0.31	0.10	0.12	0.10	**0.59**	**-0.66**	-0.14	**-0.59**
TBT 2	0.02	**0.43**	**0.44**	0.37	0.12	0.06	**-0.62**	0.26	0.14	**0.48**
TBFT 1	-0.20	**0.50**	**0.54**	0.32	-0.12	-0.12	**-0.42**	0.34	**0.40**	**0.59**
TBFT 2	0.01	-0.28	-0.11	-0.17	0.13	0.21	**0.41**	-0.27	0.05	**-0.44**
SD	-0.10	**0.43**	**0.41**	**0.46**	0.03	0.07	**-0.78**	0.37	0.23	**0.55**

The values represent the correlation's percentage between motor parameters and technical parameters; $p<0.05$.

30 DP, 30m dribbling among poles; **TBF**, Throwing the ball from distance; **TBT**, Throwing the ball towards the wall and recatching it - version I and II; **TBFT**, Throwing the ball at a fixed target-version I and II; **SD**, Slalom dribbling; **DT,** Detent; **TM**, Triangle movement; **TC**, The Combined; **LPS**, Long jump from a stationary position; **PTS**, Penta-jump; **ABS**; Abs; **TS,** Sprint test.

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In table 5, only three correlations between motor parameters and functional parameters with values over 40% can be observed.

Indirect influence on somatic parameters upon technique can be observed through their direct relation with the motor parameters (table 6).

Table 5. Correlations made between motor parameters and functional parameters

	DT	5x30	TM	TC	LSP	PTS	ABS	2x400	800	TS
CF	-0.03	0.12	-0.01	0.23	0.01	0.07	**-0.45**	0.07	0.25	0.01
BF	0.01	0.10	0.29	0.20	0.04	0.09	**0.43**	0.03	0.03	0.03
VC	0.07	-0.11	-0.15	0.04	0.23	0.17	-0.08	0.03	0.05	-0.05
RUFF	-0.05	0.15	0.03	0.21	0.01	0.05	**-0.43**	0.10	0.24	0.03
SARG	0.15	-0.20	-0.22	-0.03	0.33	0.22	0.08	-0.10	0.01	0.08
LOR	0.08	-0.09	0.15	0.02	0.21	0.17	-0.14	0.03	0.09	-0.02

The values represent the correlation's percentage between motor parameters and functional parameters; $p<0.05$.

CF, The cardiac frequency; **BF**, The breathing frequency; **VC**, The vital capacity; **RUFF**, The Ruffier test; **SARG**, The Sargent test; **LOR**, The Lorentz resistance index.; **DT,** Detent; **TM**, Triangle movement; **TC**, "The Combined"; **LPS**, Long jump from a stationary position; **PTS**, Penta-jump; **ABS**; Abs; **TS,** Sprint test.

Table 6. Correlations made between motor parameters and somatic parameters

	DT	5x30	TM	TC	LSP	PTS	ABS	2x400	800	TS
H	**0.49**	-0.13	0.05	-0.07	**0.62**	0.50	0.20	0.18	0,10	0.36
W	0.02	0.37	0.24	0.28	0.04	-0.13	-0.27	**0.42**	0.13	0.33
WSP	**0.41**	-0.16	-0.05	-0.01	**0.59**	**0.51**	-0.21	0.17	0.20	0.33
CE	**0.47**	-0.35	-0.13	-0.34	**0.49**	**0.53**	**0.53**	0.04	-0.07	-0.17
LH	0.05	0.06	0.01	0.15	0.13	-0.09	-0.23	0.06	-0.16	0.27

The values represent the correlation's percentage between somatic parameters and motor parameters; $p<0.05$.

H, Height; **W**, Weight; **WSP**, Wingspan; **CE**, Chest elasticity; **LH** – Length of the hand; **DT,** Detent; **TM**, Triangle movement; **TC**, "The Combined"; **LPS**, Long jump from a stationary position; **PTS**, Penta-jump; **ABS**; Abs; **TS,** Sprint test.

After studying the tables above, the following results can be reviewed:

- Correlations between somatic parameters and the technical ones have had as significant marks, size and wingspan.
- Correlations between functional parameters and the technical ones have had as significant marks, VC, SARG and LOR.
- Correlations between motor parameters and the technical ones have had as significant marks, 30 values ≥ 40%. Except for a single technical test, all other values were significant in relation to the abdomen and speed.
- Correlations between functional parameters and the motor ones have had significant marks, also for the tests related to the abdomen
- Correlations between somatic parameters and the motor ones have had as significant marks, DET, SAR, PENT, ABS and 2x400.

Discussions

Handball is a contact sport where strength, speed and endurance overlap and complement each other harmoniously for the high level of performance game (Chaouachi et al., 2009; Baştiurea, Stan, Acsinte, 2013). Studies show that somatic parameters, with few exceptions, have no significant influence on the technical execution (Mohamed et al., 2009; Baştiurea, Stan, Mihăilă, Crețu, 2011). It can be noted, in this case, that the somatic parameters have, however, an impact on the motor skills, and hence indirectly, on the technique of the game. Somatic aspects can be a strong point, especially in the selection and allocation of players on game positions (Gabbett, 2002; Vescovi, Brown, Murray, 2006). The most significant correlations with all technical tests are found in the case of abdomen and speed. These results are also supported by other authors who have conducted studies in this area (Milanese, Piscitelli, Lampis, Zancanaro, 2011; Gorostiaga, Granados, Ibañez, González-Badillo, Izquierdo, 2006; Gorostiaga, Granados, Ibañez, Izquierdo, 2005).

In fact, one can discuss the important role of the vertical muscle chains of the straight abdominal muscles (rectus abdominis), antagonistic to the extensor muscles of the spine and of the two strong oblique muscle chains that intersect, forming with the oblique muscle chains of the dorsal trunk some spiral chains. Thus, the muscle chain of the external oblique muscle from one part continues with the fiber direction of the internal oblique from the opposite side and in the back side of the trunk it continues with the

transversospinalis system on the same side (Nenciu, 2005).

The role of anti-gravitational forces in the development of motor skills, and hence the technical execution can be a permanent problem for coaches and even for physical education teachers aimed to study the various movements and improving executions.

Conclusions

The training for developing technical executions is based on improving the motor behavior of athletes that gives them many opportunities to solve unexpected situations that arise during a match. This concept is demonstrated by the close connection between the technical parameters and the motor ones (30 correlations, where **r** has values between 41% and 78%). As the results show, the technical test results are the most influenced by the level of abdominal strength development and speed running. Functional variables have a weak influence on motor and technical skills, in our case. The somatic parameters, although they have an insignificant direct influence on the technique, they manifest more strongly in the case of motor skills.

These conclusions should be accepted with care, as it concerns only this group of athletes, while the obtained correlations indicate the degree of association between the used variables and not the cause of those connections.

References

Acsinte, A., Alexandru, E., 2000, Handball. From initiation to performance. Bacău: Media^{TM} Publishing House;. 175 p.

Baştiurea, E., 2007, Handball. Concepts, principles and ways to improve the training. Galaţi: Academica Publishing House;. 145 p.

Baştiurea, E., Stan, Z., Mihăilă, I., Creţu, N.. 2011,The influence of anthropometric parameters and muscle-joint mobility on the speed of execution in the game of handball. Journal of Physical Education and Sport Mart 20;11(1):94-101.

Baştiurea, E., Stan, Z., Mihăilă, I., 2013, The influence of somatic, functional and motor parameters on coordination at handball players. 6th Annual International Conference „Physical Education, Sport and Health 2013 22-23 Nov;17(1):163-168.

Baştiurea, E., Stan, Z., Acsinte, A., 2013,The importance of coordination in technical training specific to handball players. The Annals of the University "Dunarea de Jos", Fascicle XV: Physical Education and Sport Management;2:Galati. Forthcoming.

Chaouachi, A., Brughelli, M., Levin, G., Boudhina, NBB, Cronin, J., Chamari, K.,2009, Anthropometric, physiological and performance characteristics of elite team-handball players'. Journal of Sports Sciences 2009Ian 15;27(2):151-157.

Cicma, IT. 2011. Experiment on the growth rates of development of specific game of handball motor qualities, trough specific means athletics, to juniors II echelon. The Annals of the University "Dunarea de Jos" Galati, Fascicle XV: Physical Education and Sport Management 2011;1:219-223.

Cordun, M. 2009, Kinanthropometry. Bucharest: CD PRESS Publishing House; 2009. 347 p.

Dragnea, A., 1993, Sports training. Theory and methodology. Vol. I. Bucharest: ANEFS; 1993. 231 p.

Epuran, M., Holdevici, I., Toniţa, F., 2001, Psychology in performance sport. Theory and practice. Bucharest: FEST Publishing House; 2001. 467 p.

Epuran, M., Holdevici, I., Psychology. Bucharest: ANEFS; 1993. 280 p.

Romanian Handball Federation (FRH). Newsletter 5. 1998; 6-9.

Gabbett, TJ. 2002, Physiological characteristics of junior and senior rugby league players. British Journal of Sports Medicine 2002 Oct;36(5):334-339.

Gheorghiu, A., Olăroiu, M., 1998, Functional investigations in family medicine practice. Bucharest: ALL Publishing House; 1998. 250 p.

Ghermănescu, KI., Gogâltan, V., Jianu, E., Negulescu, I. 1983,Theory and methods of handball. Bucharest: Didactical and Pedagogical Publishing House; 1983. 304 p.

Gorostiaga, EM, Granados, C., Ibañez, J., Izquierdo M., 2005, Differences in physical fitness and throwing velocity among elite and amateur male handball players. International Journal of Sports Medicine 2005 Apr;26(3):225-232.

Gorostiaga, EM., Granados, C., Ibañez, J., González-Badillo, JJ., Izquierdo, M., 2006, Effects of an entire season on physical fitness changes in elite male handball players. Medicine and Science in Sports and Exercise 2006 Feb;38(2):357-366.

Hantău, C. 2002, Handball. The defense game. Bucharest: Printech Publishing House; 2002. 148 p.

Mihăilă, I., 2004, Handball. Differentiated specific physical training. Republic of Moldova. Chişinău: Valinex SA Publishing House; 2004. 158 p.

Milanese, C, Piscitelli, F, Lampis, C, Zancanaro, C. 2011, Anthropometry and body composition of female handball players according to competitive level or the playing position. Journal of Sports Sciences 2011 Iul 19;29(12):1301-1309.

Mohamed, H., Vaeyens, R., Matthys, S., Multael, M., Lefevre J, Lenoir M, Philippaerts R. 2009, Anthropometric and performance measures for

the development of a talent detection and identification model in youth handball, Journal of Sports Sciences. 2009 Feb 1;27(3):257-266.

Nenciu, G. 2005, Biomechanics in physical education and sport. General aspects. Bucharest: The Foundation of the tomorrow Romania Publishing House; 2005. 128 p.

Rizescu, C. 2000, Handball. Constanţa: Ovidius University Press; 2000. 154 p.

Rizescu, C., Ciorbă, C., 2008,Technical training of novice handball players. Ovidius University Annals. Series: Physical Education and Sport/Science, Movement and Health 2008;8(2):491-496.

Roman, G., Batali, FC., 2007, Sports training. Theory and methodology. Cluj: Napoca Star Publishing House; 2007. 398 p.

Tarabas, CL. 1999,Functional exploration techniques in the practice of sports medicine specialist. Brăila: Evrika Publishing House; 1999. 185 p.

Vescovi, JD., Brown, TD., Murray, TM., 2006, Positional characteristics of physical performance in Division I college female soccer players. Journal of Sports Medicine and Physical Fitness 2006 Iun;46(2):221-226.