DIFFERENCES BETWEEN SPEED RUNNING IN POLE VAULTING COMPARE BETWEEN TOP POLE VAULTERS AND ROMANIAN NATIONAL TOP VAULTERS

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Abstract

Pole vault jumping consists of passing above a bar placed as high as possible, accomplishing the best synthesis between grabbing a lever which has to be brought to a vertical position and its usage in order to obtain the best record.

The difference between top pole vaulters athletes and Romanian top vaulter athletes is that the results are considerable inferior and one of the main reason for this situation is that the speed running in the last part of the approach have lover values.

The data on international level have been measured with specialty equipment (optical lenses) and are undertaken from certain research articles that are in connection with the theme studied by me and which I have mentioned in the bibliography.

The data of national pole vaulting athletes in 2012 was mesured with Micro Time Racer2, based on photocell, and we determinate the speed running on the last part of the approach. This data was taken during the National Championship 2012 indoor.

We observe that the diference of speed runing in the last 15m of the approach is significantly lower in the Romanian top vaulters athletes than the speed running of the world top pole vaulters.

We considered that this is the main problem for the poor results obtaind on national level of the pole vaulters in Romania. Of course the low speed on the approach combined with poor acceleration on the last steps have influence of highness of the pole grip and also of the amplitude and technicity of the jump.
Key Words: pole vaulting, speed, approach, comparison, top athletes

INTRODUCTION

Pole vault jumping consists of passing above a bar placed as high as possible, accomplishing the best synthesis between grabbing a lever which has to be brought to a vertical position and its usage in order to obtain the best record.

The spectacular evolution at pole vault is firstly due to the fabrication and usage of the pole made of synthetic, very flexible material, lasting and easy; secondly by developing and perfecting of the technique, optimizing the physical and mental capacities of the jumpers.

The apparition of a new material in 1960, glass fiber revolutionized the pole vault jump, at this moment the jumping technique changes too. Using poles made of glass fiber thanks to its great elasticity allowed the accomplishment of bigger levers that brought as a consequence the increase of the world record with more than 1 m.

Another important aspect in accomplishing better results has been the increasing number of standards concerning security by enlarging the landing surface and building in sponges.

In Romania there are some counties with traditions where pole vault jumping is practiced by the athletes of the section of Athletics.

During this period from all of Romania's counties at the Romanian National Championship at this sport only seven counties have participated. The main reason of this situation is of financial nature due to the high costs of the used materials.

International level

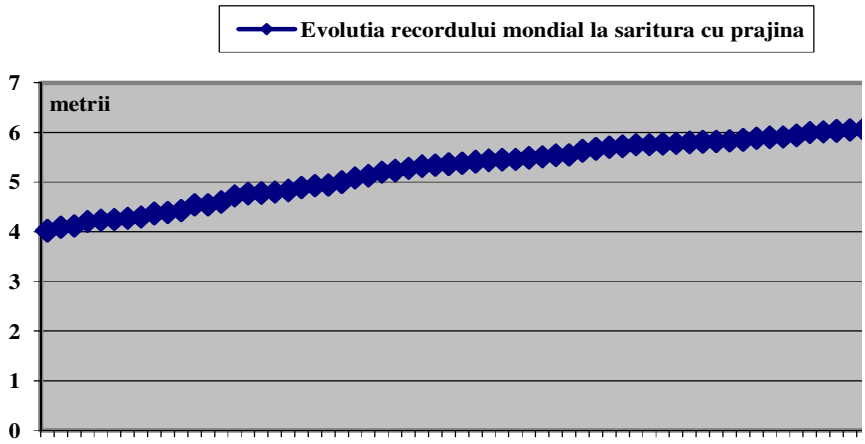

Fig 1: The evolution of the worldwide record at male pole vault jumping

This incredible progression is mainly thanks to the changes considering the material of the competition (the pole), disturbing element while running. Athletes once used poles made of cone, ash tree or chestnut tree, thancame the poles made of bamboo that eased operating with them. Immediately after this the metal poles appeared that were manufactured to fit the measures of the jumper, giving another impulse to the sport in increasing the level of performance. These kinds of poles were followed by the poles made of glass fiber, changing the technique of jumping radically.

We have to line out the fact that the best pole vault jumpers have had the highest grips considering the establishment of the best performances, grips that have grown progressive thanks to the improvement of the competition materials' quality.

- Warderman in 1942 – 4,27m with bamboo pole
- Bragg, Gustovski 1960 – 4,20m with metal
- Herve 1968 – 4,75 with glass fiber
- Takhardat 1988 – 4,95m
- Dencausse 1988 – 5,09m
- Bubka 1990 – 5,17m

The grip's height is given by the arm that grabs the pole the colsest to the superior part, the right arm in case of right- handed jumpers and the left arm in case of left-handed ones. This way the height of the grip + the performance + the record between the grip and the performance = efficiency coefficient.

Describing the mechanism of the technique at pole vault jumping

Pole vault jumping is a sport specific for athletics and it makes part of the group of jumping sports alongside long jump and high jump.

We can recoup this sport in more phases for an easier and more profound analysis. The majority of the authors who have mentioned this subject have distributed the sport into:

1. Pole grip and carry of the pole
2. Approach (beginning and middle part)
3. Drop and plant
4. The take off and penetration
5. The swing and rock- back
6. I position
7. Turn and bar clearance

RESEARCH METHOD

The data on international level have been measured with specialty equipment (optical lenses) and are undertaken from certain research articles that are in connection with the theme studied by me and which I have mentioned in the bibliography.

The biomechanical analysis of the World Championship in Rome 1987 Gros and Kunkel show that Sergey Bubka had the speed medium on the approach in the 15- 10 m section according to the end of the planting box was 9, 42 m/s, managing to increase his speed until 9,65 m/s in the 10- 5 m section according to the planting box. The measured data at the 14 finalists suggest that the jumpers have their own individual models of the way they run on the approach. These models are similar in case of the successful and unsuccessful performances. From the monitored athletes Bubka and Bell have demonstrated a remarkable increase of speed whereas the others barely maintained their speed, moreover a decrease has been observed (Vigneron). A great speed on the approach is a necessary premise but it is insufficient for successful jumps. From a biomechanical point of view it is required to obtain a greater speed on the approach with its increase at the take off as Bubka demonstrated.

In 1987 at the Athletics World Championship in Rome ten jumpers passed the bar at 5, 80 m. the first three were Bubka (6,03), Dial (5,96) and Gataulin (5,90). The measurements of speed on the approach at the Athletics World Championship in Rome 1987 were measured with photocells placed at 15- 10- 5 m according to the end of the planting box.

Table nr. 1: Analysis of the speed on the approach of the jumpers who passed over 6 m until 2001.

Nr crt	Athlet	Personal best	Athlete high	Velocity on the last 5 m m/s
1.	Bubka(UKR)	6.14	1.83	9.94
2.	Tarasov(RUS)	6.05	1.94	9.75
3.	Markov(AUS)	6.05	1.81	9.84
4.	Hartwing(USA)	6.03	1.94	9.73
5.	Gataulin(RUS)	6.02	1.90	9.75
6.	Trandenkov(RUS)	6.01	1.90	9.47
7.	Brits(RSA)	6.01	1.96	9.74
8.	Lobinger(GER)	6.01	1.90	9.62
9.	Ecker(GER)	6.00	1.93	9.71
10.	Galfione(FRA)	6.00	1.84	9.68

If monitoring the speed on the approach seems a less complicated burden, when measuring the strength we need a developed equipment. The analysis of the pole vault jumping at the World Championship in Rome has been made through monitoring the weight of the athlete (kg), his height (h), the maximum height of the grip measured at the superior point of the upper hand and the evaluation in number of kilograms of the pole (pole's hardness). This way a report between weight, height and grip plus the indexes of the pole's hardness gives us simply a value of the relative strength of every athlete.

Closer to our research theme we measured the motion speed at the Romanian National Championship that took place indoors, 2012 edition in pole vault male seniors. The timing has been done with the MicrogateRacetimer 2, a photocell was placed at 5 m from the end of the planting box, the second one was placed at 10 m from the end of the planting box and the third one at 15 m from the planting box. This way we obtained the running speed on the last 10 meters. I have noted the motion speed from 10 to 5 m with V1 and the running speed between 5- 0 m with V2, Romanian National Championship on 25-26 February 2012.

Fig.1: Device for measuring the motion speed with photocells MicrogateRacetimer 2

The Racetime 2 kit has been projected to satisfy totally the necessities of the chronometer in the athletical preparing.

The device can be installed easily and it doesn't require connection cables between its the elements, the data being transmitted by radio connection. This chronometer system can measure

total times of a race just as intermediar times depending on the position of the photocells.

The kit contains 3 photocells, 3 reflectors, 6 tripods on which the photocells and the reflectors are placed, a printer with billing, an antenna with incorporated system for transmitting the data.

The photocells work with AA type batteries, this way it isn't necessary for them to be connected with an electrical source and they function independently.

The printer with billing has a proper accumulator with a great autonomy but it can be connected to an electrical source too.

Theoretically in order to bring improvements at national level by knowing the approach better at the level of this sport regarding the approached theme, I wish to create a conscious vision of the physical differences (speed, strength) between the top athletes and the national champions also.

Practically I wish that by improving the speed and strength indexes specific for the pole vault jumping at the level of the group I train to benefit of the increases of measurable performance at the competition they tak part.

On methodological level I wish to bring improvements of the methodology of training in order to optimize theresults of the jumpers from Romania.

RESULTS

Table nr. 2: Monitoring of the speed indexes in pole vault at the Romanian National Championship 2011 (indoor)

Nr crt	Initials	Approaching distance (m)	Result (m)	Approaching speed m/s	Pole length (m)	Index of the pole (Kg)
1.	B.A.	25	4,10	7,59	4,60m	70
2.	M.T.	25	3,90	7,062	4,60	70
3.	N.A.	21	4,10	7,11	4,30	68
4.	F.I.	34	4,30	8,45	4,50	73
5.	K.L.	32,30	4,75	6,94	4,75	80
6.	M.A.	30	4,10	7,17	4,50	75
7.	P.B.	29,70	4,70	8,29	4,60	82
8.	L.S.	30	0	7,31	4,45	73
9.	M.F.	26	3,90	7,60	4,30	66
10.	D.B.	31	4,00	7,48	4,30	68
11.	D.A	21	4,00	8,93	4,30	68

At this competition the timing has been done manually and it has been measured on the whole distance of the approach.

Table 3: Monitorizing the speed on the approach in pole vault at the Romanian National Championship, 2012 edition (indoors)

Initials	V1(10-5 m)	V2(5-0m)	Vt(10-0m)	Dif v2-v1	Performanta
P.B.	7,93m/s	8,70 m/s	8,33 m/s	0,77	4,70 m Loc 1
D.A.	7,57 m/s	7,93 m/s	7,75 m/s	0,36	4,60 m loc 2
K.L.	7,81 m/s	8,06 m/s	7,93 m/s	0,25	4,50 m loc 3

The comparative chart of the speed on the approach in pole vault between the best result at the Romanian National Championship, the World Championship in Helsinki 2005 and the jump which demolished the world record.

Tabel 4: Monitorizing the speed on the approach on World Championship Helsinki 2005

Name	High of the bar (m)	Speed 16-11 m/s	Speed 11-6m m/s	Diferences
BLOOM	5,50	9,03	9,04	0,02
BLOOM	5,65	8,85	8,88	0,03
BLOOM	5,75	9,04	8,99	-0,05
BLOOM	5,80	9,01	9,04	0,03
WALKER	5,50	8,96	9,23	0,26
WALKER	5,65	8,91	9,09	0,18
WALKER	5,75	9,16	9,26	0,10

GERASIMOV	5,50	8,77	8,77	0,00
GERASIMOV	5,65	8,77	8,96	0,19
PAVLOV	5,65	8,90	8,97	0,05
PAVLOV	5,65	8,77	8,87	0,09
GIBILISCO	5,50	9,11	9,23	0,12
HYSONG	5,50	8,99	9,16	0,16
KRISTIANSON	5,50	9,38	9,43	0,5

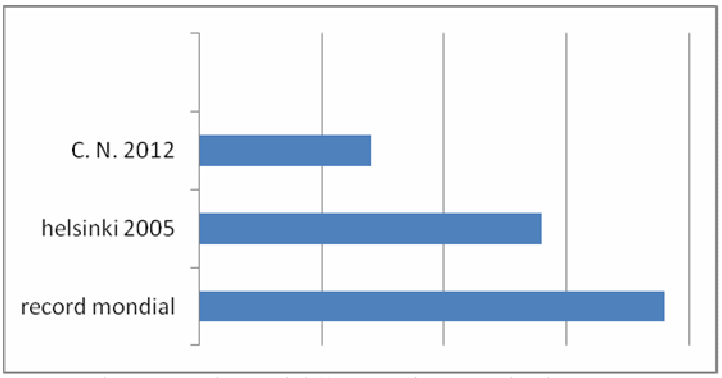

Fig. 2 – The approach speed differences between the three competitions

Obtained results:
World record: 6,14 m
Helsinki: 5,80 m
Romanian National Championship: 4,70 m

DISCUSSION

To reach god results as the world top athletes, one of the most important factor is the approaching speed, in our case the running speed of the pole vaulter run on the end of the approach.

Without a god running speed is impossible to take a high grip on the pole and also use a hard pole, this two factors conditioning to reach high performances. A god technique is not a guaranty to pass a high without a high approaching speed. (Bubka 9,9m/s).

CONCLUSION

After measuring the speed running on the last part of the approach to the National Championship of Romania we established that the best pole vaulter who obtain first place, run in the last 5m with a speed of 8,33 m/s, to obtain a result of 4,70 m. The athlete who obtain the second place, run with a speed of 7,75 m/s and obtain a result of 4,60 m, and the third place athlete run with a speed of 7,93 m/s, for a result of 4,50 m.

From this experiment, by comparing the results of top pole vaulter on world level with top pole vaulters of European level and with Romanian top pole vaulters we observed a big difference first on speed running on the approach. This is the first main reason that the national results in pole vaulting in 2011 – 2012 was lover with more than 1 m as the international achievements.

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