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STUDY ON TOP ATHLETES AT 400 M HURDLES

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Abstract

The work is part of a series of studies, which we have been doing for years on high-performance athletes, with a view to establishing a premier model on event. A review of the best performances in the world, in our opinion is welcome for making up the national team. We proposed in this research to observe the dynamics of the parameters mentioned below, worthy of being taken into account in the selection of athletes. The paper aims at extracting essential data for the selection and preparation of high performance athletes in anticipation of major international competitions. As objectives, we set: the study of bibliography; the collection and tabulation of the following parameters: the performance of the best athletes of all time, their age, height and weight; processing the above-mentioned statistical and mathematical data regarding the following indicators: number of cases, percentage, average, median, mode, range of motion, standard deviation, coefficient of variation, coefficient of correlation; evaluation of the results and their interpretation.

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Keywords: Athletes, 400 m hurdles, high performance, statistics.

1. Introduction

An overview of global athletes at the middle of the Olympic period, is welcome, as it helps in detaching certain key elements in the selection and preparation of our athletes. In evaluating athletes we must always take into account two fundamental components of human performance in general: the biological and psychological.

The research is part of a study on sports performance, measurement and evaluation. It is a transverse type because the collected results were obtained by 31 July 2018. A review of the best performances in the world, in our opinion is welcome for making up the national team. We proposed in this research to observe the dynamics of the parameters mentioned below, worthy of being taken into account in the selection of athletes.

As objectives, we set: the study of bibliography; the collection and tabulation of the following parameters: the performance of the best athletes of all time, their age, height and weight; processing the above-mentioned statistical and mathematical data regarding the following indicators: number of cases, percentage, average, median, mode, range of motion, standard deviation, coefficient of variation, coefficient of correlation; evaluation of the results and their interpretation (Cărbunaru, 2009, p. 58-79).

2. Problem Statement

As a general definition, we can say that the performance is "the result of human action superior to known results" (Țifrea, 2002, p. 25).

It is obvious that the main objectives of the training are participating in competitions, challenge other athletes in the competition for a place in the hierarchy of sports and achieve high performance. However, the importance of the competitions passing of these purposes, because they are the most important and specific methods of estimation the progress of athlete (Bompa, 2001, p. 258).

In evaluating athletes we must always take into account two fundamental components of human performance in general: the biological and psychological. In this way the body composition corresponds to the structural components of the human body composed of elements of very different nature and density (bone, fat, water, protein), maintained in constant proportion and functionally integrated (Cordun, 2011, p. 87-110). In this way the precise knowledge of the athlete's height and weight and is welcome framing it in a test pattern.

Many times in the sport's practice, while coaches respected the specific training method's guideline, worked with athletes selected by the constitutional model, they did not achieved the expected performance, because they neglected psychological component. The goal of mental preparation for competitions consists in forming for athletes, of a system of attitudes and behavior, with operational and regulative character through which it is flexible and adapts to contest's situations and opponents actions (Holdevici, Epuran, & Tonița, 2008, p. 244-270)**.**

3. Research Questions

What is the average women performances ?

What is the average women somatic characteristics ?

What is the average men performances ?

What is the average men somatic characteristics ?

There's correlation between indicators ?

4. Purpose of the Study

The paper aims the detachment of essential data for the selection and preparation of high performance athletes in anticipation of major international competitions

5. Research Methods

As a research method we have used the case study, observation, statistics, mathematics and graphics.

6. Findings

It has been processed the data of 107 athletes. Following data collection resulted in 825 performances (IAAF, 2018), 825 data on age, 815 data on height and 792 data on weight of 400 m hurdlers Sport Reference, (2018).

In what follows, we present the 2 tables and 4 graphs representative undertaken research.

Table 01. Statistics indicators top women outdoor all time

Indicators	Performance (sec)	Age (years)	Height (cm)	Weight (kg)
N	499.00000	499.00000	493.00000	471.00000
N max	54.00000	37.00000	185.00000	82.00000
N min	52,34000	18.00000	160.00000	52.00000
Range of motion	1.66000	19.00000	25.00000	30.00000
Mode	53.78000	27.00000	170.00000	57.00000
Median	53.70000	27.00000	173.00000	63.00000
Average	53.59681	26.83768	173.70183	62.58386
Quartile 1	53.40500	24.00000	170.00000	57.00000
Quartile 3	53.86000	29.00000	177.00000	66.00000
Quartile difference	0.45500	5.00000	7.00000	9.00000
Dispersion	0.11620	12.14800	25.17478	40.73554
Average of absolute deviation	0.27382	2.74285	4.04043	4.70258
Standard deviation	0.34088	3.48540	5.01745	6.38244
Coefficient of variation	0.63600	12.98696	2.88854	10.19822
Correlation*	-0.01843	0.09190	0.05428	0.00204

Table 02. Statistics indicators top men outdoor all time

Indicators	Performance (sec)	Age (years)	Height (cm)	Weight (kg)
N	326.00000	326.00000	322.00000	321.00000
N max	48.00000	35.00000	200.00000	88.00000
N min	46.78000	20.00000	170.00000	67.00000
Range of motion	1.22000	15.00000	30.00000	21.00000
Mode	47.94000	26.00000	183.00000	72.00000
Median	47.81500	26.00000	186.00000	80.00000
Average	47.75706	25.97546	184.78882	77.73832
Quartile 1	47.64000	24.00000	183.00000	72.00000
Quartile 3	47.93000	28.00000	188.00000	82.00000
Quartile difference	0.29000	4.00000	5.00000	10.00000
Dispersion	0.04621	9.70492	30.21627	26.52965
Average of absolute deviation	0.16912	2.39460	4.04128	4.52371
Standard deviation	0.21497	3.11527	5.49693	5.15069
Coefficient of variation	0.45013	11.99313	2.97471	6.62568
Correlation*	-0.03803	-0.03203	0.12870	0.10116

* In order from left to right: correlation between performance and age, the correlation between performance and height, the correlation between performance and weight the correlation between age and weight.
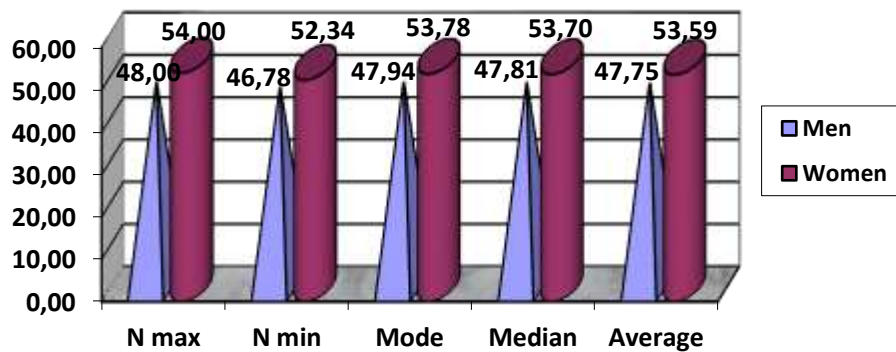

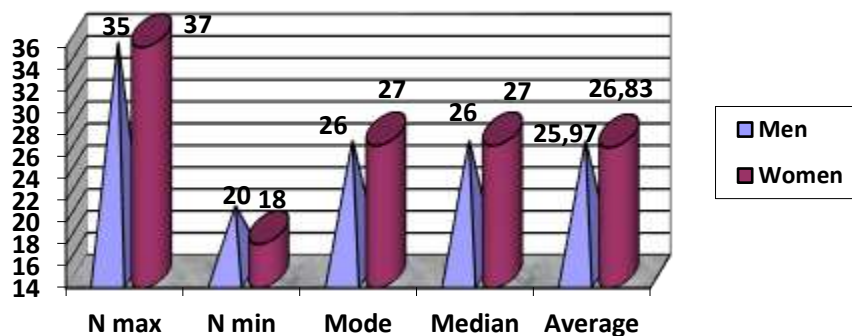**Figure 01**. Statistic indicators of performances top 400 m. hurdles outdoor all time

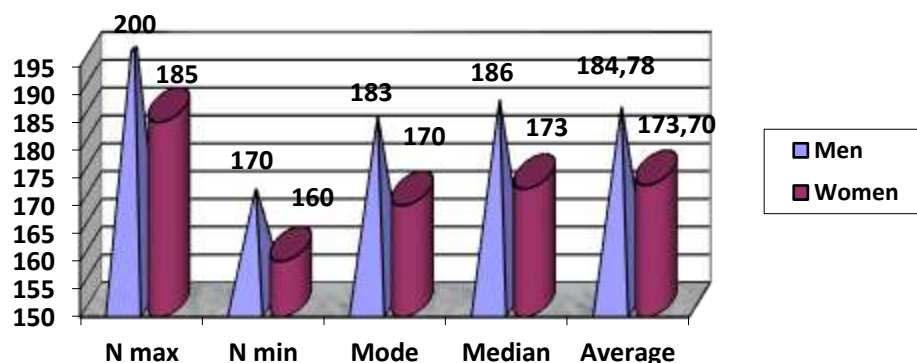**Figure 02**. Statistic indicators of age top 400 m. hurdles outdoor all time

Figure 03. Statistic indicators of height top 400 m. hurdles outdoor all time
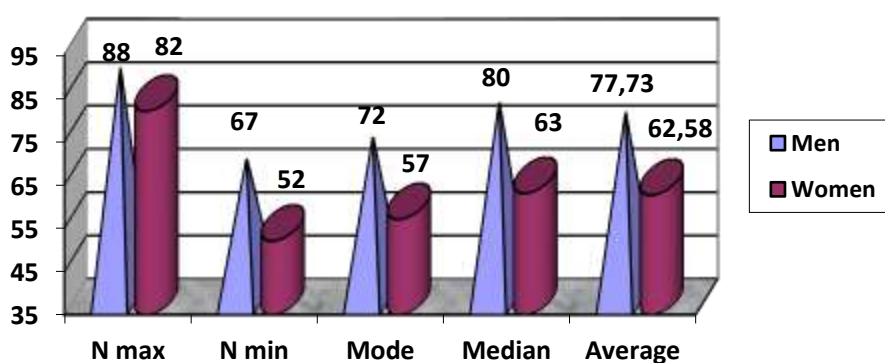

Figure 04. Statistic indicators of weight top 400 m. hurdles outdoor all time

Statistical indicators of results (table 1 and table 2, Figures 1, 2, 3 and 4):

- Compared with the 1993 data, the best performance of study is equal to men (46.78 s) and better to women 52.34 s front of 53.17 s (A.N.E.F.S., 1993, 42 p.)

- The number of cases in men (326) is lower than the female (499) with 173.

- The range of motion in results for women (1.66 s) is greater than that of men (1.22 s) with 0.44 s.

- The mode of performances to the men is 47.94 s and for women 53.78 s.

- The median of performances to the men is 47.81 s and for women 53.70 s.

- The average of performances to the men is 47.75 s and for women 53.59 s.

- The middle interval (half of cases) for men is lower than that of women, as follows: 0.29 s between 47.64 s and 47.93 s at the men and 0.45 s between 53.41 s and 53.86 s at the women.

- We have a very good homogeneity both men (0.45%) and women (0.63%).

Statistical indicators of age (table 1 and 2):

- Compared with the 1993 data for best performance, age of women in our study is 1 years lower (25 years as compared to 26 years) and for men is equal with 26 years (A.N.E.F.S., 1993)

- The number of cases for women (499) is greater than that of men (326) with 173.

- Maximum age for women (37 years) is greater than that for men (35 years) with 2 years.

- Minimum age for women (18 years) is lower than that for men (20 years) with 2 years.

- The range of motion in age for women (19 years) is greater than that for men (15 years) with 4 years.

- The mode and median of age for women (27 years) is greater than that for men (26 years) with 1

year.

- The average of age for women (26.83 years) is greater than that for men (25.97 years) with 0.86 years.

- The middle interval (half of cases) for women is greater than that of men, as follows: 5 years between 24 and 29 years at the women and 4 years between 24 and 28 years at the men.

- We have a low homogeneity both women (12.98%) and men (11.99%).

Statistical indicators of height (table 1 and table 2):

- Compared with the 1993 data, for the best performance, height of men in our study is 1 cm greater (194 cm as compared to 193 cm) and for women is greater with 10 cm (180 cm as compared to 170 cm). (A.N.E.F.S., 1993)

- The number of cases for women (493) is greater than that of men (322) with 171.

- The range of motion for women (25 cm) is lower than that for men (30 cm) with 5 cm

- The mode of height for women is 170 cm and for men 183 cm

- The median of height for women is 173 cm and for men 186 cm

- The average of height for women is 173.70 cm and for men 184.78 cm

- The middle interval (half of cases) for women is greater than that of men, as follows: 7 cm between 170 cm and 177 cm at the women and 5 cm between 183 cm and 188 cm at the men.

- We have a very good homogeneity both women (2.88%) and men (2.97%).

Statistical indicators of weight (table 1 and 2, Figures 1, 2, 3 and 4*):*

- Compared with the 1993 data, for the best performance, weight of men in our study is 2 kg greater (82 kg as compared to 80 kg) and for women is greater with 8 kg (66 kg as compared to 58 kg). (A.N.E.F.S., 1993)

- The number of cases for women (471) is greater than that of men (321) with 150.

- The range of motion for women (30 kg) is greater than that for men (21 kg) with 9 kg.

- The mode of weight for women is 57 kg and for men 72 kg.

- The median of weight for women is 63 kg and for men 80 kg.

- The average of weight for women is 62.58 kg and for men 77.73 kg.

- The middle interval (half of cases) for women is lower than that of men, as follows: 9 kg between 57 kg and 66 kg at the women and 10 kg between 72 kg and 82 kg at the men.

- We have a good homogeneity at women (10.19%) and very good at men (6.62%).

   - We have no correlation between the parameters of the investigation.

7.   Conclusion

- The model of performance (the average data) in women is 53.59 s.

- The somatic model (the average data) in women has the following characteristics: age 26.83 years, height 173.70 cm, weight 62.58 kg, body mass index: 360.27 g/cm.

- The model of performance (the average data) in men is 47.75 s.

- The somatic model (the average data) in men has the following characteristics: age 25.97 years, height 184.78 cm, weight: 77.73 kg, body mass index: 420.66 g/cm.

- Is there a lack of correlation between other parameters investigated.

Acknowledgments

References

A.N.E.F.S. Catedra de atletism, F.R.A, (1993). Date statistice privind ultimele 8 ediţii ale Jocurilor Olimpice, [Statistical data for the last 8 Olympic Games], f.e., Bucureşti.

Bompa, T. O. (2001). Teoria şi metodologia antrenamentului sportiv. Periodizarea. [Theory and methodology of sports training. Periodization], Bucureşti: C.N.F.P.A.

Cărbunaru, A. B. (2009). Statistică. Bazele statisticii. [Statistics. Basics of statistics] Bucureşti: Editura Universitară.

Cordun, M. (2011). Bioenergetică şi Ergometrie în Sport. [Bioenergy and Ergometry in Sport]. Bucureşti: Editura CD Press.

Holdevici, I., Epuran, M., & Toniţa, F. (2008). Psihologia sportului de performanţă. Teorie şi practică. [Performance sports psychology. Theory and practice]. Bucureşti: Editura FEST.

IAAF (2018). Retrieved from (Access 18.06.2018, 12:10) www.iaaf.org

Sport Reference (2018). Retrieved from (22.07.2018, 16:25) www.sports-reference.com

Ţifrea, C. (2002). Atletism, [Athletics]. Bucureşti: Editura DARECO.