Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XXI, ISSUE 2 Supplement, 2021, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XXI, ISSUE 2 Supplement, 2021
September 2021, 21 (2): 234 - 239
Original article

A COMPETITION PERIOD EVALUATION IN THE TRIPLE JUMP EVENTS IN TERMS OF SEASONAL VARIABLES

BERFIN SERDIL ÖRS[1], IŞIK BAYRAKTAR[2], TUNCAY ÖRS[3]

Abstract

Problem Statement: Triple Jump (TJ) is one of the horizontal jumping events of athletics and the training plan is considered to be indispensable for achieving targeted performance in TJ, as in other athletic events. If the annual plans are determined according to the requirements specific to the sports event; high-efficiency levels can be reached by athletes. Examining a competition season of the elite athletes ranked in the top 100 of the worlds and creating prediction models of the season's best and season average performances based on the average of the first two performances (AF2P) will help trainers and training scientists to plan a competition period. For this reason, the current study aimed to determine the variables of elite athletes' competition seasons in TJ events and to constitute estimation models of SB and season average performance based on AF2P.

Methods. The research group consisted of male and female elite athletes ranked in the top 100 in TJ during the 2018 season. Participants' competition information was reached from the 2018 world rankings published on the International Athletic Federation's (IAAF) official web page. The age of the athletes, the total number of days in the season, the number of competitions, the season's best score (SB) according to the season average, the percentages of the initial and end scores were calculated. General characteristics of the participants were presented as means and standard deviations (±SD). Pearson correlation coefficients (r) were used to express the relationships between parameters. Quadratic equations were used to find coefficients of determination (r^2) for the relationships. Statistical significance was set at $p<0.05$.

Results. A statistically significant, positive, and high correlation was found in female triple jumpers ($r=0.80$; $p<0.001$), and a moderate relationship was found for men TJ ($r=0.71$; $p<0.001$). There was a high positive correlation between season average and AF2P for both female and male athletes ($r=0.88$; $p<0.001$; $r=0.80$; $p<0.001$; respectively). When the relationship between AF2P and season-end performance was examined, it was calculated that there was a moderate level relationship for female jumpers ($r=0.62$; $p<0.001$) and weak relationships for male ($r=0.41$; $p<0.001$) triple jumpers.

Conclusion. The prediction models based on the AF2P will be used to predict the best performance of the season and these equations can be considered as an early evaluation for the coaches to predict the whole season.

Keywords: athletics, prediction equation, season best performance.

Introduction

The triple jump (TJ) is an athletic event similar to the long jump and in TJ, athletes attempt to jump as far as possible. Moreover, TJ is considered to be one of the most complicated disciplines in athletics because of the specific abilities and the difficulty inherent in the technical performance method (Caeiro et al., 2018; Elbadry et al., 2019). The TJ is the combination of (1) technique, (2) form, and (3) momentum. These three features are combined with speed to produce explosive strength to generate as much force as possible in the shortest time. For this reason, TJ needs specific training methods and training plans. However, there are many complicated training methods to improve the performance of TJ (Elbadry et al., 2019). On the other hand, to reach high-efficiency levels, training plans have to be prepared according to aim, content, and specific to TJ. To put it another way, periodization is one of the main parameters of achieving high-level performance, and in the literature, studies support the idea that periodized programs provide greater improvements in performance variables (Fleck, 1999) than non-periodized programs (Rhea, Ball, Philips, & Bucket 2003). On the other hand, Ors et al. (2020) determined the relationships of elite athletes' competition season variables in vertical jumping events of athletics (high jump and pole vault) and the authors constituted prediction models of season-best (SB) and season performance average based on season initial performance. The results of the study indicated that by using prediction equations for high jump and pole vault, coaches would be able to easily create predictions about the SB and season performance average at the beginning of the season. Moreover, they suggested that models creating this kind of foresight should be used for other athletics events, too. Following this information, it is thought that examining a competition season of the elite

[1]Department of Coaching Education, Faculty of Sport Sciences, Aydin Adnan Menderes University, Aydin, Turkey
[2]Department of Coaching Education, Faculty of Sport Sciences, Alanya Alaaddin Keykubat University, Alanya, Turkey
[3]Ministry of National Education, Aydin, Turkey
Received 11.04.2021 / Accepted 8.06. 2021

athletes ranked in the top 100 of the world and creating prediction models of the season's best (SB) and season average performances based on the average of first two performances (AF2P) will help trainers and training scientists to plan a competition period. For this reason, the current study aimed to determine the variables of elite athletes' competition seasons in TJ events and to constitute estimation models of SB and season average performance based on the AF2P.

Methods

The current study conducted with competition information of male and female elite athletes ranked in the top 100 in 2018 TJ events. The International Athletics Federation (IAAF) publishes competition information on their official web page. This web page was used to collect competition information for triple jumpers during the 2018 season. Date of births, date of competitions during the season, and the ratings were obtained from the database of IAAF. The following parameters were calculated for each athlete separately:

- Ages,
- Season days (the total number of days in the season)
- The number of days between the competitions (days/comp.),
- The total number of competitions (total comp.),
- The number of competitions in which the season's best (SB) performance was achieved (SB comp.),
- The ratio of the SB to the total number of competitions (SB%),
- The percentages of the initial (start%), end (end%), and average (mean%) scores.

Statistical Analysis

IBM-SPSS 20.0 software was used for statistical analysis of the study. General characteristics were presented as mean±standard deviation. Besides, to analyze the relationships between parameters Pearson correlation coefficients (r) and to find coefficients of determination (r^2) for the relationships polynomial regression analysis were used. Finally, the quadratic equations were used to create prediction equations for SB and season average performances. Statistical significance was set at $p<0.05$.

Results

Male triple jumpers had an average of 109.2 season days while female athletes had an average of 98.9 days. SB performances were 16.81 and 13.95 for male and female athletes; respectively (Table 1).

Table 1. Descriptive statistics of triple jumpers

			Age	Season Days	Days / Comp.	Total Comp.	SB Comp.	SB Comp %	AF2P	End	SB	Mean	Start %	End %	Mean %
TJ	M *(n=100)*	Mean	25.70	109.20	15.30	7.60	4.60	60.10	16.32	16.34	**16.81**	16.35	96.90	97.30	97.30
		SD	*4.90*	*51.40*	*7.10*	*3.00*	*2.90*	*28.10*	*0.49*	*0.50*	***0.33***	*0.38*	*3.10*	*2.60*	*1.20*
	F *(n=100)*	Mean	25.50	98.90	13.80	7.70	4.70	61.30	13.52	13.60	**13.95**	13.60	96.60	97.50	97.40
		SD	*4.50*	*40.80*	*6.70*	*2.70*	*2.60*	*26.00*	*0.46*	*0.48*	***0.36***	*0.40*	*2.50*	*2.30*	*1.00*

TJ: Triple Jump; Comp: Competition

In the TJ, when the relationship between AF2P and SB performance was examined, a statistically significant, positive, and high correlation was found in female triple jumpers (r=0.80; p<0.001), and a moderate relationship was found for men TJ (r=0.71; p<0.001). There was a high positive correlation between season average and AF2P for both female and male athletes (r=0.88; p<0.001; r=0.80; p<0.001; respectively). When the relationship between AF2P and season-end performance was examined, it was calculated that there was a moderate level relationship in female TJ (r=0.62; p<0.001) and weak relationships in male (r=0.41; p<0.001) TJ athletes (Table 2).

Table 2. The relationship of athletes' AF2P in TJ with SB, season average, and season end performances

AF2P			**SB**	**Average**	**End**
TJ	**Female**	r	0.80*	0.88*	0.62*

	p	p<0.001	p<0.001	p<0.001
Male	r	0.71*	0.80*	0.41*
	p	p<0.001	p<0.001	p<0.001

TJ: Triple Jump; SB: Season Best
**p<0.001

I. A quadratic regression analysis was performed between season AF2P and SB performance variables which showed a high positive correlation. According to this:

a) In female TJ, it was seen that season AF2P could explain 70% of the SB performance. In other words, 70% of SB performance is related to season AF2P. SB Prediction equation related to season AF2P was found as follows:

$SB = 57.461 + (AF2P \times -7.047) + [(AF2P)^2 \times 0.283]$

b) In men's TJ, it was seen that season AF2P could explain 65% of the SB performance. In other words, 65% of SB performance is related to season AF2P. SB Prediction equation related to season AF2P was found as follows:

$SB = 96.795 + (AF2P \times -10.284) + [(AF2P)^2 \times 0.33]$

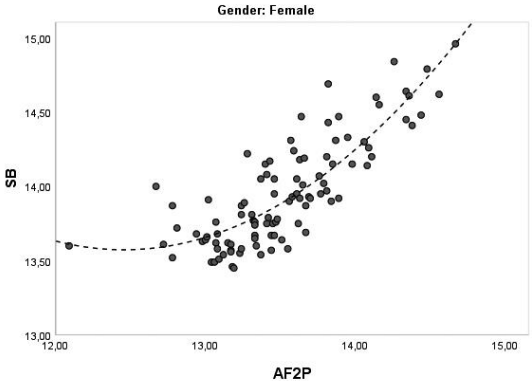

Figure 1. The relationship between SB and AF2P of female athletes

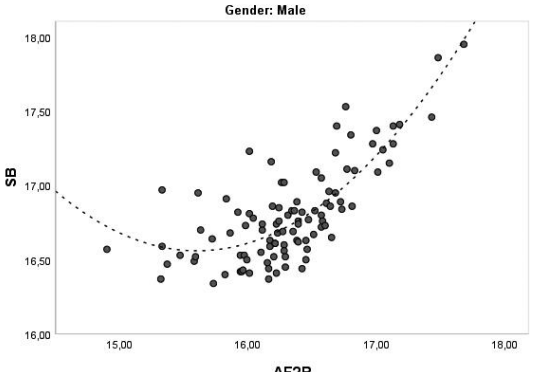

Figure 2. The relationship between SB and AF2P of male athletes

II. A quadratic regression analysis was performed between season AF2P and season average
III. performance variables which showed a high positive correlation. According to this:

a) In female TJ, it was seen that season AF2P could explain 81% of the season's average performance. In other words, 81% of the season's average performance is related to season AF2P. Season average equation related to season AF2P was found as follows:

$Season\ Average\ Performance = 51.361 + (AF2P \times -6.342) + [(AF2P)^2 \times 0.262]$

b) In male TJ, it was seen that season AF2P could explain 69% of the season's average performance. In other words, 69% of the season average performance is related to season AF2P. Season average equation related to season AF2P was found as follows:

$Season\ Average\ Performance = 69.585 + (AF2P \times -7.151) + [(AF2P)^2 \times 0.238]$

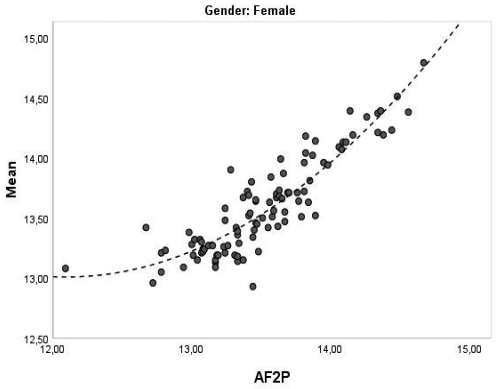

Figure 3. The relationship between season average and AF2P of female athletes

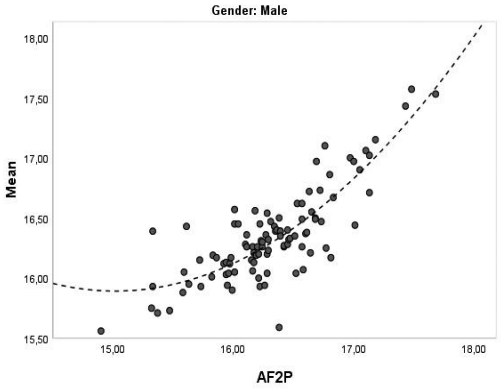

Figure 4. The relationship between season average and AF2P of male athletes

The prediction equations found in the current study were applied to the eight female and eight male triple jumpers' 2019 variables (Table 3 and Table 4).

Table 3. Experimenting SB and season average performances with prediction models for with female and male athletes in the 2019 season

Athlete	AF2P	Season Average Performance	SB	Predicted SB Performance	Differences between SB and Predicted SB Performance (%)	Predicted Season Average Performance	Differences between Season Average and Predicted Season Average Performances (%)
FEMALE ATHLETES							
Yulimar ROJAS	14.94	14.93	15.41	15.35	0.4%	15.09	-1.1%
Shanieka RICKETTS	14.56	14.54	14.93	14.85	0.5%	14.56	-0.2%
Caterine IBARGUEN	14.59	14.57	14.89	14.88	0.1%	14.60	-0.2%
Liadagmis POVEA	14.53	14.65	15.05	14.82	1.6%	14.53	0.9%
Keturah ORJI	14.61	14.49	14.72	14.91	-1.2%	14.62	-0.9%
Darya NIDBAYKINA	14.52	14.43	14.64	14.80	-1.1%	14.51	-0.5%
Kimberly WILLIAMS	14.38	14.30	14.64	14.64	0.0%	14.33	-0.2%
Kristin GIERISCH	14.16	14.03	14.61	14.42	1.3%	14.09	-0.4%
MALE ATHLETES							
Will CLAYE	17.77	17.62	18.14	18.25	-0.6%	17.67	-0.3%
Omar CRADDOCK	17.47	17.38	17.68	17.84	-0.9%	17.29	0.5%

Pedro PICHARDO	17.07	17.14	17.62	17.40	1.2%	16.87	1.6%
Jordan Alejandro DÍAZ FORTUN	17.44	17.22	17.49	17.81	-1.8%	17.25	-0.2%
Ruiting WU	16.87	17.04	17.47	17.22	1.4%	16.68	2.2%
Yaming ZHU	17.07	17.18	17.74	17.40	1.9%	16.87	1.9%
Cristian NÁPOLES	16.52	16.82	17.40	16.96	2.6%	16.40	2.6%

AF2P: The Average of First Two Performances; SB: Season-best Performance

Discussion

One of the main findings of the currents study was that a high positive correlation between AF2P and SB performances ($r=0.80$; $p<0.001$) was found for female athletes. Moreover, for male athletes, this relationship was found to be moderate ($r=0.71$; $p<0.001$). AF2P could explain 70% and 65% of the SB performance for female and male athletes, respectively. Finally, AF2P could explain 81% and 69% of the season average performance for female and male athletes, respectively.

It is reported that the bases of contemporary training theory were founded about four decades ago. It is obvious that the knowledge was far from complete and workload levels, results, and demands were much lower at that time (Issurin, 2008). In the progress of time, sports coaching has been changing over the last decades and has become more professionalized. This professionalization of sports has been bringing challenges to the coaches.

Coaches should prepare their programs related to an athlete's outcome which means coaches should help their athletes to improve sport-specific skills and tactics (Kjær, 2019). On the other hand, with the recent changes and updates in the sports area, the number of competitions that athletes attend has been increasing.

Looking at the Olympic champions' competition days, it is seen that long jump athletes had 200 days while pole vault athletes had 265 days (Issurin, 2008). Besides, Acikada (2018) states that when the single contest periodization is made, the length can be 5-5.5 months and when the double contest periodization is performed, the second competition period may last between 3-3.5 months. Moreover, Ors et al. (2020) stated that top-level pole vaulter athletes had an average of 113.6 days (for male athletes) and 105.3 days (for female athletes) competition days. The authors stated that top-level high jumpers had an average of 112.4 competition days for male athletes and 107.1 competition days for male athletes. In the current study, triple jumpers had an average of 109.2 competition (approximately 3 months) days for male athletes and 98.9 (approximately 3 months) competition days for female athletes. These results seem to support the findings of Ors et al. (2020).

Finally, according to prediction equations created in the current study, it is seen that AF2P could explain the 70% (for female athletes) and 65% (for male athletes) of SB performance. On the other hand, AF2P was found to explain 81% of the season's average performance for female athletes while this ratio was 69% for male athletes. When the prediction equations were applied to eight female and eight male triple jumpers ranked in the top 10 (season 2019) the differences between SB-predicted SB and season's average-predicted season's average performances were as follows:

(1) The equations predicted the SB performance with a 0.78% difference for female athletes,
(2) The equations predicted the SB performance with a 1.13% difference for male athletes,
(3) The equations predicted the season's average performance with a 0.55% difference for female athletes,
(4) The equations predicted the season's average performance with a 1.16% difference for male athletes,

Considering these results and the differences from the actual performances, it can be suggested that coaches will be able to prepare their training plans by predicting the SB performance at the beginning of the season by using the equations created in the current study.

References

Açıkada C., 2018, Training science. Training principles, periodization and form trainings. Sports Publishing Company.

Caeiro F., Silva, D., & Oliveira, M., 2018, Men ' s Performance in Triple Jump : an approach with

Extreme Value Theory Men ' s Performance in Triple Jump : an approach with Extreme Value Theory. *5th SMTDA Conference Proceedings*, *January*, 127–135.

Elbadry N., Hamza A., Pietraszewski, P., Alexe, D. I., & Lupu, G., 2019, Effect of the French contrast method on explosive strength and kinematic parameters of the triple jump among female college athletes. *Journal of Human Kinetics*, *69*(1), 225–230. https://doi.org/10.2478/hukin-2019-0047

Fleck S.J., 1999, Periodized strength training: A critical review. Journal of Strength and Conditioning Research, 13(1), 82-89.

Issurin V., 2008, *Block periodization: breakthrough in sports training. Ultimate athlete concepts* (p. 228).

Kjær J. B., 2019, The Professionalization of Sports Coaching: A case study of a graduate soccer coaching education program. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *24*(May 2018), 50–62. https://doi.org/10.1016/j.jhlste.2018.11.001

Örs B. S., & Bayraktar, I., 2020, A Competition Period Evaluation Concerning Seasonal Variables of Elite Track and Field Athletes in Vertical Jumping Events: A Different Insight for Coaching Education. *Journal of Educational Issues*, *6*(1), 439. https://doi.org/10.5296/jei.v6i1.17258

Rhea M. R., Phillips, W. T., Burkett, L. N., Stone, W. J., Ball, S. D., Alvar, B. A., & Thomas, A. B., 2003, A comparison of linear and daily undulating periodized programs with equated volume and intensity for local muscular endurance. *Journal of Strength and Conditioning Research*, *17*(1), 82–87. https://doi.org/10.1519/1533-4287(2003)017<0082:ACOLAD>2.0.CO;2