



## SPORTS RESULT AND TRAINING ANALYSIS IN ATHLETICS TRIATHLON FOR GIRLS UNDER 14 YEARS

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### ABSTRACT

Athletic disciplines for girls under 14 years consists of mandatory type of triathlon during winter season. This type of combined events is the first step to athletics for these competitors. We are particularly interested in their preparation and achievements, because this group is the future of the sport. We analyzed their specific training loads for the different means and made comparison to established training programs. Also, we analyzed the tendency in competition results in recent years and found out positive improvement, proven with new National records. We established that running volume for speed is 4 times bigger in Unified programs than what is accomplished in training for the age group. Volume for general endurance is 10 times bigger than what athletes usually do. Additional means like vertical and horizontal jumps, in our opinion are too elevated in the official program documents. In conclusion we deem that preparation has different proportions compared to the few official Unified training programs and actualization is needed.

**Key words:** triathlon, girls U14, result, preparation

### PURPOSE

Combined events in athletics are very complex and difficult discipline. To be good at so many events, sport preparation must be very carefully planned and performed (2, 3, 17). This means that best athletes have all-round qualities, which in general this is the main task of the sport preparation (5, 6). Young athletes pass through different stages of preparation and all of them must be adapted and compliant with the specifics of the age group (3-4; 15; 18). This can help with building the needed physical abilities and can lead to better adaptation to the training load (11, 12, 16). At this age (10-13 years) it very important to learn the correct technique of the disciplines, because later this is prerequisite for good results. (1, 14). Training activities and in general the organization of learning, training and competition processes should be based on the age patterns in the birth of children, and exercise has a constructive effect only when applied according to the capabilities of the growing organism. (13, 10). When working with young athletes the

processes of growth and formation of organs and systems, increases demands to the body of young athletes (7-9).

Presenting information about training proses is important prerequisite for improvement and optimization of preparation. There is lot of data for senior age group and professional athletes, but available information for young athletes is somehow out of the focus. This led our interest in the direction of young athletes' performance and training preparation.

### METHODS

The main aim of the study is to reveal result tendencies and to make comparison between established training programs and actual training programs in combined events under 14 years of age.

Main task of the study is to:

1. Form a database from official results from protocols of the BFLA for the period between 2010 and 2020.

2. Presenting the dynamic of results and establishing the tendencies.
3. Analyzing training program and comparing training loads from theoretical resources to the information of our study

The database that is from the official result for the investigated period. To be more accurate we eliminated athletes who have accomplished 0 point in a discipline. We also considered the choice for second discipline. Because according to the rules athletes can choose for a second discipline between long jump and high jump. And for last discipline between 600 m and shot put.

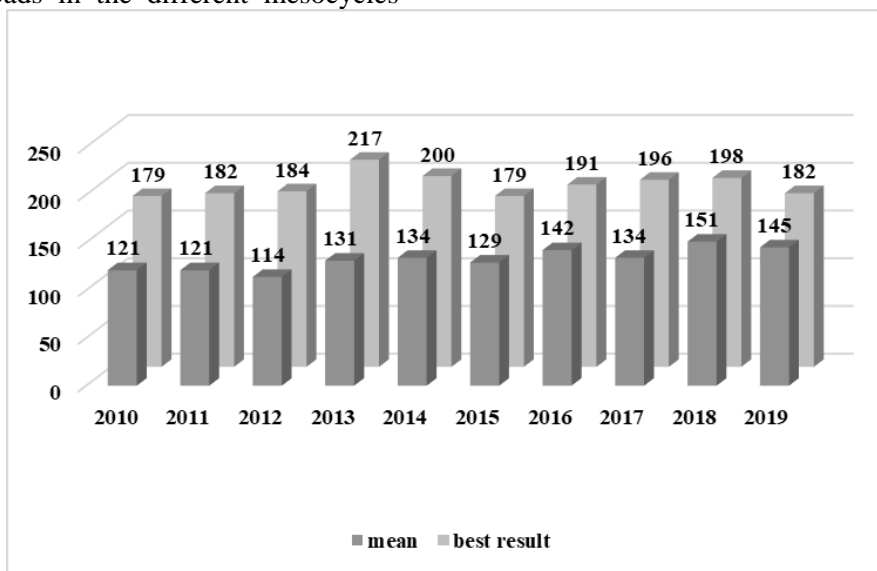
From the statistical methods we use variance analysis. The following basic descriptive parameters were calculated for the variables in this research: arithmetic mean, standard deviation, minimum and maximum result, and range. This type of analysis was applied to accomplished results in the different disciplines and also in the points for each discipline and the overall result. Correlation analysis is used to determine which discipline has the biggest impact on the overall result.

We separated training means to: running for speed (including crouch start; flying start), running for general endurance, running for speed endurance, number of horizontal and vertical jumps, number of cleared hurdles. We established the training loads in the different mesocycles

during training year, as this gives us the opportunity to reveal the yearly loads. For the purpose of the study the training parameters of the different means are taken from coach dairies. We designated the data from the Unified programs and make a comparison with the estimated values from out study.

**RESULTS**

Achieving the best possible results is the main aim for each athlete. When the good results are shown at the most important competition, we can deem that the highest aim for athlete and coach is reached. Results at competition are reflection of preparation. That is why we are interested in analyzing the results in triathlon for girls. During the set period the best result for each year is above 179 points. We can note one peak in 2013 with 217 points. The following year there is also performance above the 200-points. In 2015 we see insignificant drop of the points, but it is immediately followed by a gradient peak the next few years. Mean result is low at the beginning of the period. From 2013 we can notice increase of the result. Positive tendency shows at the end of period reaching 151 points. Improving of the mean result at the end of the period lead us to the conclusion that more athletes are getting better, which leads to good performance of more athletes. This is good for athletics, because from these girls the future jumpers, sprinters and runners can emerge.



**Figure 1.** Sports results in athletic triathlon for girls

**Table 1** show results from variance analysis of athletes' performance in different events. The overall number of investigated cases is 500. If we look at result in 60 m girls managed to reach mean result of 9.21 sec. The slowest runner covered the distance in 11.39 sec, which is a big difference for sprint events. But we can note that athletes this age are more likely to have big variance in sprint results. This can be due to bad start technique. They are not used to react to a starting gun, which can additionally slow them down. Sometimes we can see athletes who does not finish the run-in full speed and start to decelerate before the finish line. Also, young athletes are not able to keep straight line while running. Many factors can relate to the big scope in results for sprint event. All these factors also contribute to the high measurement in asymmetry (0.808).

When we analyze variance in long jump results, we can note again big difference between the best result (4.97 m) and the lowest (2.52 m), which gives a scope closet to results achieved from

some athletes (2.45 m). The mean result for the group, which is close to 4 m, shows satisfactory level of the athletes.

For the final discipline, which is the most frightening for all young athletes, the mean results show 2:16,4. For 600 m tactics is very important but at this young age even when coaches inform their athletes it is not certain that they will follow the advice. Indoor 600 m run is also performed on a standard oval track, in our case with 4 lanes. This can lead to obstructions between athletes. All this can lead do poor performance and the variance analysis show that the slowest time is over 3 minutes. Similar times in our study lead to big numbers in asymmetry ( $As= 1.163$ ) and excess ( $Ex=4.539$ ). However, the best performance is 1:45,2 which means that some girls have good special endurance qualities. The last heat for the 600 m run consists of the athletes with most points at the moment, which gives the opportunities to chase each other and make better performance.

**Table 1.** Variance analysis of sport results in different events in girl's triathlon

	n	X min	Xmax	R	$\bar{X}$	S	V	As	Ex
<b>60 m</b>	500	8,17	11,39	3,22	9,21	0,41	4,42	0,808 *	2,579 *
<b>long jump</b>	500	2,52	4,97	2,45	3,88	0,41	10,58	-0,106	0,326
<b>600 m</b>	500	01:45,2	03:01,5	01:16,3	02:16,4	10,24	8,11	1,163*	4,539 *

The interdependence between the result in the discipline and the individual disciplines valid for the study of individuals are presented in **Table 2**. The correlation is made based on the data on the points received by the athletes when achieving a certain sports result.

Between the three disciplines of athletic triathlon for girls under 14 (indoor) and the final achievement (points) we find high levels of correlation. And the highest is between the disciplines 60 m and long jump - where we discovered strong correlation (respectively 0.743 and 0.758). Between the sports achievement and 600 m the level of correlation represents a significant relationship - 0.683. Between the discipline 600 m and the disciplines with speed-

power character (60 m and long jump) we find a weak dependence. Between the disciplines 60 m and long jump the level of correlation is 0.54, and the significant correlation in our opinion is lower than expected. This is probably due to the differences in technique in the implementation of the two disciplines, which implies the incomplete manifestation of the abilities in one of the two disciplines.

The correlation dependence shows that in order to be successful, young all-rounders must have well-developed speed and speed-power qualities, because the sports result is mostly determined by the performance of the athletes in the 60 m sprint and long jump.

**Table 2.** Correlation between points in separate events to overall result for athletic triathlon.

<i>event</i>	<i>60 m</i>	<i>Long jump</i>	<i>600 m</i>	<i>overall points</i>
<b>60 m</b>	1			
<b>Long jump</b>	0,54**	1		
<b>600 m</b>	0,235**	0,148**	1	
<b>overall points</b>	0,743**	0,758**	0,683**	1

We managed to extract data from real training programs for athletic triathlon. **Table 3** represents training volume during the winter preparation. In the table are shown the most common athletic means. Typically, preparation for the age group starts in the middle of

September and the competition is at the end of January. Usually 5 and 6 mesocycle, and duration is according to the length and number of containing microcycles. In our case there are 5 mesocycle before the competition, which means that their duration is close to one month.

**Table 3.** Training volume for some standard training means in athletic triathlon for girls

<b>Means/mesocycle</b>	1	2	3	4	5	<b>Total</b>
Speed runs (km)	0,85	0,85	0,63	1,06	1,44	4,83
Speed runs crouch start. (km)	0,42	0,42	0,1	0,25	0,47	1,66
Speed endurance runs (km)	3,5	3,5	7	4,36	11,08	29,44
Tempo endurance run (km)	3	3	6,1	3,6	6,6	22,3
General endurance (km)	4	7	5	11	2,9	29,9
Speed-power uphill runs (km)	0,65	0,65	0,24	0,38	0,27	2,19
Hurdle runs to 5-th (number of clearance)	13	13	8	15	0	49
Overall hurdle attacks	65	65	40	75	0	245
game (count)	3	3	0	4	2	12
High jump and long jump (number of attempts)	60	60	82	92	115	409
Horizontal jumps (number of jumps)	70	70	100	170	150	560
Vertical jumps (number)	35	35	50	0	0	120
Speed-power jumps with light weight (number)	0	0	30	50	100	180
High knee runs (km)	0,12	0,12	0,42	0,73	0,42	1,86
General physical preparation (number of trainings)	2	2	4	5	3	16
Solid ball (number of throws)	110	110	150	200	220	790

In general, the first macrocycle is longer than the second, which leads to different training volume. Depending on the used athletic means most of them have a bigger volume at the autumn-winter season, but not necessarily. For instance, in autumn, we can have more work load for general endurance to achieve the needed base for further training load. We can see that from our data that this kind of work is gradually rising to make a smooth transition and the prepare the athlete.

From the data we can note that training volume for almost every single athletic drill is with proper curve. At the beginning of the season volume is low, then with time it rises to reach a peak, and right before the competition volume drops. This is important for reaching a good level of sports form and to be fit at the correct time (during the competition).

We deem that the presented data from us is an important addition to the existing programs and suggested training volume. This information is

necessary to make a comparison with the annual programs because changes always appear for the progression in sport result.

preparation phases. The proposed models are taken from the analyzed group. Microcycles differ from one another and are not the same for current mesocycle.

The following **Tables (4-7)** contain the main objectives in a typical mesocycle in different

*Table 4. Exemplary focus of weekly training during general preparation phase*

<b>general preparation phase</b>		
Monday	<b>speed + speed-strength</b>	3x10 m,3x30 m,2x60 m; half-squat jumps 3x8 reps.; shot put forward and backwards throws 10 reps.
Tuesday	<b>high jump technique + general physical training</b>	standing high jump without and with bar x 8 reps; short approach (3 steps;5 steps) x8 reps; кр.)x7 бр; bodyweight exercise
Wednesday	<b>hurdle technique</b>	hurdles short distance and lower height 6-8 rep;2-3 x 80 m 80%
Thursday	<b>game/ general endurance</b>	
Friday	<b>long jump technique and speed-strength qualities</b>	long jump (9-10 steps) from elevated platform + horizontal jumps
Saturday	<b>high jump technique</b>	standing high jump without and with bar x10 reps.; 3 steps short approach x10 reps; 5 steps short approach x10 reps; reaching for high object with head and knee x10 reps
Sunday	rest	

*Table 5. Exemplary focus of weekly training during special preparation phase*

<b>special preparation phase</b>		
Monday	<b>speed and speed-strength qualities</b>	3x30 m,3x40 m,3x50 m; scissors jumps 3x5 reps.; jumps from low to elevated platform 3x10 reps; ankle jumps 3x10 reps.
Tuesday	<b>high jump /shot put technique</b>	standing high jump x8 reps.; approach and imitation of the jumps; short approach (3 steps) x 5 reps; short approach (5 steps)x7 reps; //forward and backward throw x15 reps. standing shot put 8-12 reps.
Wednesday	<b>hurdle technique + speed</b>	hurdle technique/ 1 step in between, 3 steps in between; high knees between hurdles 2-3reps. (6 hurdles) + 60 m-80 m + general physical fitness
Thursday	<b>general endurance</b>	cross 3 km
Friday	<b>high jump technique</b>	long jump 10-12 steps.5-6 reps. + horizontal jumps (standing 3-step-jumps on 1 leg; standing-5-step jump on 1 leg, standing-5-step jumps, kangaroo hops)
Saturday	special endurance and game	100 m-200 m-300 m-200 m-100 m
Sunday	rest	

*Table 6. Exemplary focus of weekly training during pre-competitive phase*

<b>pre-competitive phase</b>		
Monday	<b>speed and speed-strength qualities</b>	crouch starts 2x20 m, 2x30 m, standing starts 2x40 m, 1x50 m + vertical jumps
Tuesday	<b>high jump /shot put technique and general physical fitness</b>	standing high jump with bar x 3 reps; short approach with jumps (3 steps) x 3 reps; full approach 10-12 reps// forward and backward throws x 5 reps.; standing shotput 8-12 reps.
Wednesday	<b>speed + hurdle technique</b>	standard height and distance hurdles 3-4 reps, 2x60 m
Thursday	<b>special endurance and general physical fitness</b>	500 m+300 m, crunches 3x20 reps, back press 2x10 reps.
Friday	<b>long jump technique</b>	long jump full approach 7-8 reps.; 3x100 m
Saturday	<b>general endurance and game</b>	
Sunday	rest	

*Table 7. Exemplary focus of weekly training during competitive phase*

<b>competitive phase</b>		
Monday	<b>speed and speed-strength qualities</b>	crouch starts 20 m, 30 m, starts 40 m, 50 m + vertical jumps
Tuesday	<b>high jump technique</b>	standing high jump 3 reps. Full approach 5 reps.; reaching high object with head and knee 7-10 reps.
Wednesday	<b>special endurance</b>	500 m
Thursday	<b>hurdle technique</b>	standard height and distance hurdles 3 reps. 1-st hurdle; 3. reps 3-rd hurdle; 1x60 m
Friday	<b>warm up</b>	
Saturday	<b>competition</b>	competition
Sunday		

With the collected data we can make a comparison with the existing programs. The following figures represent training means with the highest difference. We discovered that work for speed is with over 4 km larger in the Unified programs. Speed training is important for young athletes, especially when reaching the specific

period for developing speed. If we missed this window, it could have an impact through the whole sport career of a particular athlete. So, we can deem that adding appropriate amount of speed work can have positive impact.

Research data shows more than 30 km special endurance volume than the Unified programs for the age. We suggest that this is due to the importance of the last discipline of triathlon (600 m), which often can resolve the winning positions. And sometimes athletes far from the leading group can climb up to top three only if they make a good final run. So maybe coaches require more volume for special endurance.

Another difference, but very significant is the total number of horizontal and vertical jumps. Research data shows around 1700 jumps, and

according to Unified programs athlete this age must do over 13000 jumps. According to us this is too much training load of this kind because the musculoskeletal system is not ready to endure.

Hurdle clearance is another important aspect in training for combined events. In winter competition 60 m with hurdles is not included, but this does not indicate that hurdles are excluded from the winter preparation. Unified programs point nearly 1400 hurdle clearance, but research data show around 500.

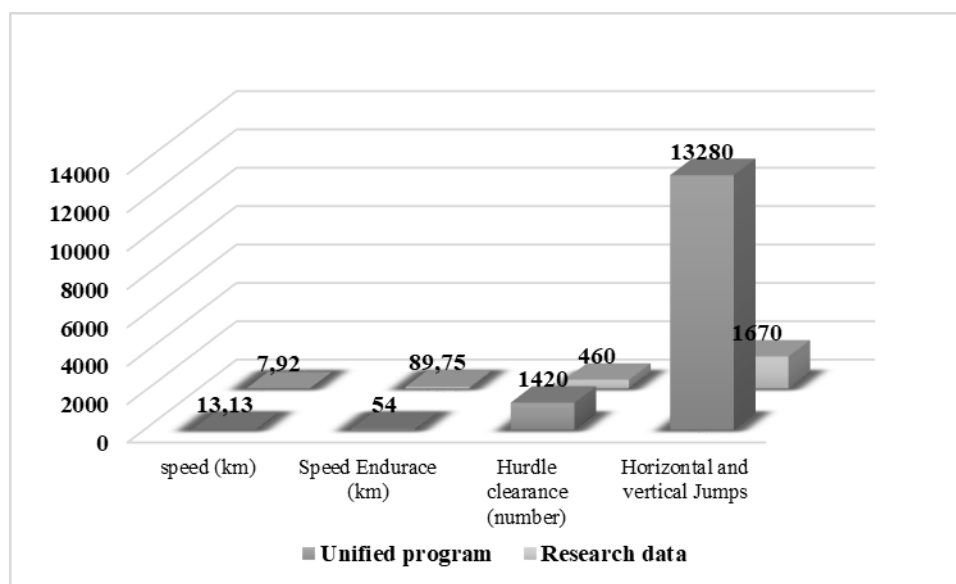


Figure 2. Comparison of some athletic means from Unified programs and research data.

## CONCLUSION

In recent years we are witnessing improvement of sport result in athletic triathlon. The positive tendency is confirmed by the National records made by young athletes, and the close results in the leading positions for the studied period.

When all-round training is performed properly, we can achieve the complex aspects in preparation, which favors the future performance of the athletes, not only in the all-around, but also in the individual disciplines.

Analysis of the annual training is necessary and aims to help the trainers-pedagogues by giving them basic guidelines and at the same time providing an opportunity for change and

optimization, according to their individual athletes.

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