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COMPETITIVE ACTIVITY IN THE SPRINT DISTANCE TRIATHLON. CONTEMPORARY TRENDS AND THEIR REGULARITIES

ACTIVIDAD COMPETITIVA EN EL TRIATLÓN DISTANCIA SPRINT. TENDENCIAS CONTEMPORÁNEAS Y SUS REGULARIDADES

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ABSTRACT

The link that has been established between pedagogy and didactics with sports development has allowed facing the challenges compelled by the modern sports scenario. We have to deepen in the knowledge of the different sports modalities for a better use of every result coming from this relationship. Such knowledge can only be acquired through practical study of competitive activity. In this research, a functional and structural study of the competitive activity in the Sprint triathlon was carried out. More than 4000 data obtained from youth competitions were analyzed to achieve this. The percentage corresponding to each segment was analyzed with respect to the total distance and the value of ratio by segment was calculated with respect to the total triathlon time. All information was processed using the IBM SPSS 24 program. Results showed that the highest percent of the distance corresponds to cycling and running segments. Concerning rates, they showed similar values in the different events allowing defining them by ranges, with upper and lower limit values and their average value.

Keywords:

Triathlon, Sprint, competitive activity.

RESUMEN

El vínculo que se ha establecido entre la pedagogía y la didáctica con el desarrollo deportivo ha permitido enfrentarse a los retos que impone el panorama deportivo moderno. Para un mejor provecho de los resultados que emanan de esta relación es necesario profundizar en el conocimiento de las diferentes modalidades deportivas. Este conocimiento solo es posible adquirirlo mediante el estudio práctico de la actividad competitiva. Con esta investigación se realizó un estudio funcional y estructural de la actividad competitiva en el triatlón Sprint. Para ello se analizaron más de 4000 datos obtenidos de competencias juveniles a los que se les analizó el porciento correspondiente a cada segmento con respecto a la distancia total y se calculó el valor de las razones por segmento con respecto al tiempo total en el triatlón. Toda la información se procesó con el programa SPSS 24 de IBM. Los resultados mostraron que el mayor por ciento respecto a la distancia corresponde a los segmentos del ciclismo y de la carrera. En cuanto a las razones estas mostraron valores similares en los diferentes eventos permitiendo definirlas por rangos, con valores límites superiores e inferiores y su valor medio.

Palabras clave:

Triatlón, Sprint, actividad competitiva.

INTRODUCTION

Sporting demands are nowadays more and more demanding. The competitive agenda is increasingly tight, maximizing the number of competitions, and ranking for the most important is actually troublesome due to the increase of countries that have reached a high level in sports. Besides, there is a successive increase in the sports results level.

As a reply to such demands, contemporary planning structures have been managed, seeking some fit-training ways that allow athletes to keep the best-suited sport shape for longer; helping them to them to go through the extensive competitive agenda in the most successful feasible way.

Work volumes have reached such values that it is impossible to achieve improvements in sports performance from continuously increasing them, resorting to intensity, increase as a way to achieve improvements in athletes.

One solution is to strengthen pedagogy and didactics relationship with sports development. This link has allowed coaches to increase their knowledge "*on educational aspects and to establish improvements in sports techniques performance, new training methods and the creation of new styles*". (García, et al., 2018) But for a better use of the benefits of this relationship, it is necessary to know in depth the characteristics of sports disciplines and especially competitive events.

This knowledge can only be acquired by conducting a competitive activity study. Allowing the creation of competitive activity-behavior patterns and knowledge of the basic budgets of the sport in competition, achieving a solid know-how that allows us to achieve improvements from the very selection of sports talents, we are going to be capable of responding to the basic demands of sport, up to new ways of controlling performance.

Triathlon is an individual, combined and endurance sport consisting of three segments: swimming, cycling and running. It is performed in the aforementioned order above and the chronometer does not stop until the end of the race. Therefore, being able to perform the test in the shortest possible time will be the main objective of the competitors.

Although it is a sport with three modalities combined, each one being a segment of the test, it would be incorrect to assume that a separate analysis of each segment would be enough to understand the peculiarities of this discipline.

Several investigations have aimed to know Triathlon peculiarities. We can mention those of Vleck, et al. (2006), among them. Who found that lower performance in the swimming segment contributes to more work in the early cycling stages in elite Olympic triathlon, and this in turn influences the running race performance.

Matching results were those obtained by Peeling, Bishop & Landers (2005). These researchers proved that swimming the swimming segment, in a Sprint triathlon, at intensity between 80-85% of the rhythm performed in a single swimming test at a distance of 750 meters, significantly benefited performance in cycling and overall performance in triathlon.

The second transition (race-cycling) could be said as the most studied. On this (Hue, Le Gallais, Chollet, Boussana & Prefaut, 1998) compared the results when performing a 10-kilometer foot race after riding a bicycle for 40 kilometers and when this was done without previous cycling. The researchers observed that the values of oxygen consumption, expiratory volume, respiratory and heart rates were higher in the walking race after cycling.

On the other hand, Boussana, et al. (2002), studied the effect of cycling on the performance of respiratory muscles in a subsequent foot race in elite and national triathletes. The results obtained showed less mechanisms of adaptation of inspiratory muscles in national level athletes. This causes greater ventilation thus inducing an increased fatigue of the inspiratory musculature.

Millet and Bentley research were also related to the second transition (2004). They compared the running race energy output after the cycling segment between junior and senior elite triathletes of both sexes. They found that senior athletes showed higher peak power values than junior athletes, as well as a lower increase in energy output in the case of senior girls compared to junior.

All the studies mentioned above are directed towards the influence of swimming segments on which they occur and what is their response. A different study is carried out by Polo & Brizuela (2001). They studied the proportion of each segment among themselves and the relative importance of each over the total Olympic triathlon time. They found that the total time will be mostly influenced by cycling and running segments.

Our work aims to carry out a practical study of the competitive activity in the Sprint distance triathlon. This study will be carried out from the structural and functional point of view. For this we will analyze the total distance of competition and what percent corresponds to each specialty within that volume. We will calculate each segment time ratio relating to total time. And finally, the average time spent in each segment and the total competition time will be calculated.

DEVELOPMENT

The study on competitive activity that we will carry out in our research will be from both structural and functional points of view. Structural because we will analyze the total distance of competition and what percent corresponds to each specialty of that total. And functional because we analyzed what is the time ratio of each segment with respect to the total time, and finally the average time in each segment and the total time of competition was calculated.

Data collected for analysis was obtained from the website triathlon.org, the official site of the International Triathlon Union (ITU), an international organization recognized by the International Olympic Committee. In its database we collected the junior Sprint category events corresponding to youth Olympic Games, world championships and regional championships from this category. Data was collected from 2010 to 2016.

Four events held in Cuba were analyzed, of these, two youth national championships in 2008 and 2014, a Central American sport championship held in 2006 and the Havana Triathlon in 2016. The overall compilation allowed to process a total of 68 events corresponding to the Sprint distance triathlon and the Sprint junior category.

Participants

Results from 4257 competitors in the junior Sprint category, aged between 16 and 18 years, were processed. Of these 2661 were male and 1596 were female.

Instruments

Microsoft Office Excel 2007 program was used for ratio analysis. Results that did not have the total time spent in the triathlon were overruled, as this is the time from which each segment ratio will be obtained. Statistical program SPSSv.24 was used for ratios processing. The program overruled 1.9% of the regional junior cup data, qualifying them as lost, and then processing the remaining 98.1% as valid. For the rest of the events, 100% of the data was processed. The cases dismissed by sex were 1.6% for men and 1.2% for women, which meant 98.4% and 98.8%, were processed. From the results provided by the statistical program we considered for the analysis: mean, lower and the upper limit where the range of values is located.

Process

The practical study began with the calculation of the percentages corresponding to the distance of each specialty with respect to the total distance. Then we proceeded to convert each segment partials, which initially were in hours and minutes, to only seconds. The formula used was:

Part time = TIME (A2) * 3600 + MINUTE (A2) * 60 + SECOND (A2)

With all the partial times converted in seconds, we begin the calculation of ratios. The ratio is a binary relation between magnitudes where two quantities are compared by their quotient in order to note how many times it contains one another, as long as the compared magnitudes have the same unit of measure. By calculating the ratio between the total time in the triathlon and the time taken in each segment, we will know how many times the total time of the triathlon contains each of the segments. For its calculation, the quotient between the total and partial time per segment was obtained. Example:

Rate = Partial in the swim segment / Total time in the triathlon

Processing went on after ratios were calculated. The segments were calculated according to their sequence in the triathlon (swimming, cycling and running). Mean confidence interval was 95%.

The first events processed were the regional junior cups that contain the majority of processed data with a total of 49 events from 2013 to 2016 and a total of 3147 competitors analyzed. Then we continued with the four national events with 126 competitors, followed by the two youth Olympic Games with 125 competitors and finally the world championships from 2010 to 2016 with a total of 859 competitors.

After calculating the ratios, the average time per segment was calculated. To perform this calculation, we used the Tukey tri media, a robust nonparametric estimator, which is a heavy average of the first, second and third quartile, because results as being so heterogeneous showed outliers or extremes which could distort the average value obtained with estimators as the mean (average). The formula applied was:

Rate=((CUARTIL.EXC(H2:H74;1)+CUARTIL.EXC(H2:H74;3))/2+CUARTIL.EXC (H2: H74;2))/2

In the previous example, H2 and H74 are the initial and final cell of the column to which the tri media is being calculated.

Results

The sum of the three segments of the Sprint triathlon is 25.750 meters. Taking this distance as 100 percent we calculated the equivalent values to each segment. The values obtained were that from total distance a 2.91%, belongs to swimming a 77.67% to cycling and a 19.42% to running.

Ratios calculation was a more complex due to the volume of data to be processed. The data obtained allowed their representation in ranges, represented (table 1) with lower and upper limit values and an average.

Table 1. Swimming Ratios.

Swimming			
Event	Lower limit	Half	Upper limit
Regional Junior Cups	0.1628	0.1634	0.164
Events held in Cuba	**0.120**	0.148	0.169
Youth Olympic Games	0.144	0.161	0.169
World Championships	0.147	0.156	**0.171**

In swimming, the number of extreme cases higher (table 2) than the upper limit was 35 for 0.82% and lower extreme cases was 13 for 0.30%, which sum totals 1.12% of the total number of competitors. So, we can say that more than 98% of the cases studied are in the range between 0.120 as a lower limit and 0.164 as an upper limit.

Table 2. Cycling Ratios.

Cycling			
Event	Lower limit	Half	Upper limit
Regional Junior Cups	0.514	0.515	0.516
Events held in Cuba	0.466	0.512	**0.544**
Youth Olympic Games	0.508	0.511	0.515
World Championships	**0.445**	0.488	0.528

Of the results obtained from this segment, the total (table 3) of extreme values was 50 subjects, which represents 1.19 percent of the total. Of these, upper ends were 24 for 0.57% and 26 lower ends for 0.62%. The largest numbers of extreme cases are located in the world championships with 26.

Table 3. Running Ratios.

Running race			
Evento	Lower limit	Half	Upper limit
Regional Junior Cups	**0.295**	0.296	0.296
Events held in Cuba	0.321	0.318	**0.322**
Youth Olympic Games	0.306	0.310	0.313
World Championships	0.299	0.303	0.307

The distribution of extreme values in the race was 29 upper ends for 0.69% and 14 as lower ends for 0.33%. Totalizing 43 extreme values in the race for a 1.02.

The ratios range for each segment can be summarized in the following table.

Table 4. Lower and upper limits of ratio ranges for each segment.

	Swimming	Cycling	Running
Lower limit	0.120	0.445	0.295
Half	0.142	0.494	0.308
Upper limit	0.164	0.544	0.322

Range results by sex behaved as follows (Table 5):

Table 5. Range results by sex in each segment.

		Swimming	Cycling	Running
Female	Lower limit	0.158	0.506	0.300
	Higher limit	0.160	0.509	0.302
Male	Lower limit	0.163	0.510	0.294
	Higher limit	0.164	0.512	0.296

Average time values after processing all partials of each competitor in all the events were as follows (table 6):

Table 6. Tri media results of time by segments and total.

	Swimming	Cycling	Running	Total Time
Tri media (seconds)	629	1958	1155	3845
Time	10´28”	32´37”	19´15”	1h4´5”

In the previous table the values of the tri media were presented in seconds and the second row corresponds to the value of the tri media but taken to minutes and seconds.

Discussion

The percentages obtained by segments related to total distance clearly show the predominance of cycling and running over the total distance of the Sprint triathlon. Cycling is approximately 27 times higher than swimming and four times running. This in turn exceeds swimming by almost seven times. When these two segments have a greater distance, the duration of these segments must also be greater. These values may justify why there is so much research on the second transition. Likewise, they can affect work volumes distribution during loads planning by the trainer.

For ratios analysis these were presented in tables which relate the results of each type of event studied by segment. We consider necessary to remember that ratio value tells us how much of the segment is represented in the total time of the triathlon. Considering the above, it can be understood that the lower ratio value is, the lower time spent in the segment was, which could have a positive effect on the final time.

By analyzing different levels events we could expect greater differences between the values obtained. In the table on swimming we observed that the lower limit in the events celebrated in Cuba is lower to the rest of the analyzed events, however, the upper limit equals that of the Olympic youth games and is close to that of the regional cups and world championships. This shows that in Cuba it is not that all triathletes swim faster, but that there are triathletes that take less time than the total time to complete the swimming segment.

Observing the behavior of the cycling segment note that in this case the lowest average value is located in the world championships, the rest of the groups of events are located near 0.51. The lowest lower limit was placed in the world championships with 0.488 although the values in the rest of the events were close to 0.5. The highest upper limit is found in national events with 0.544, not too far from the values in the other events that are around 0.52. The total average was 0.506.

In the running segment, the lowest mean value was located in the regional cups but all values are close to 0.3. Similar behavior was found in the lower limit where the lowest value was presented by the regional cups but all close to 0.3. In superiors the greatest value was presented in national events.

In the analysis of the three segments, a similar behavior is observed in the ratio values for the cycling and running segments. Among the swimming values, although there are no great differences, these are somewhat more remarkable. This could indicate that there is a more even level in the cycling and racing segments worldwide.

As we previously pointed out, improving the value of a segment ratio would mean that the time in that segment decreased. Which can have an impact on the end time if the same time is kept in the rest of the segments, which would increase their ratio value, since the representation of these in the total time of the triathlon would be enlarged.

In a practical way knowing the ratios behavior the coach can know if there really was an improvement in the total time of the triathlon because the total time of all the segments was improved or because the improvement only occurred in some of them.

To be similar, both the segment time and the rate thereof, it is necessary that the final time in the triathlon is equally matched as shown in table 7; the example shows the results by segments and total of two competitors. Both show equal values in the total time of the triathlon and although in the swimming segment they reflect a difference of three seconds, the difference between their rates is 0.001.

Table 7. Comparison between swimming segment ratios of two competitors with equal time in the Triathlon.

Event	No. of the competitor	Swimming	Ratio	Time in the Triathlon
Antalya 2013	37	605	0.174	3470
Antalya 2013	38	602	0.173	3470

Knowing the ratios range allows the coach to define which of the specialties that make up the Sprint triathlon need greater workloads, regardless of the individual needs of each athlete. On the other hand, we consider as its greatest utility the possibility of accurately reproducing the spatial and temporal characteristics of the Sprint triathlon. In this way, when coaches need to apply triathlons of a smaller scale, seeking to meet tactical, technical or physical objectives, they can achieve this by making them comply with the percentages by segments with respect to the total distance of the new distance used. And with the values of the ratios they can check if the duration of the same responds to the real parameters in how much time.

CONCLUSIONS

The percentages of the distances of each segment with respect to the total distance are higher in cycling above running and swimming. Ratios for the duration of each segment with respect to the total time of the triathlon behaved the same way.

Regardless of the competitive scenario, it was possible to group the duration of the segments by ranges, allowing defining their upper and lower limits.

Both cycling and the race have the highest values in percent with respect to distance and with respect to ratios, so they are the segments that will most influence the total triathlon time.

The study of competitive activity is a valid reference for acquiring important information to support many of the sports preparation tasks, as well as methodological aspects of difficult solution and with committed decision making for both sports teacher and athlete.

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