

Acrobatics as a new trend in Aerobic Gymnastics

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Abstract:

Aerobic Gymnastics (AG) is a relatively young kind of sport in which athletes perform continuous, complex and high-intensity aerobic movement patterns to music. Code of Point (COP) in Aerobic Gymnastics modifies every 4 years in accordance with the world trends, reduce the subjectivity of judge panel and introduce new requirements at competitions. One of these requirements of COP edition 2017-2021 is the integration of acrobatic elements into the AG routine of athletes. This paper attempts to show the significance of integrating acrobatic preparedness into the training process of AG athletes to make the athletes more competitive at World Championships. Thus, we identified which acrobatic elements were used in the routine of the finalists of the Aerobics Gymnastics World Championships (2018), by analysing the content of the finalists' routine performed. Consequently, we classified acrobatics used in Artistic, Difficulty and Lifts. The results obtained confirmed the fact that acrobatics used in routines of elite athletes was more focused in Artistic. Then, we integrated acrobatic elements into the training process of AG athletes of Tyumen, Russia, which have led to the positive changes in the acrobatic technical preparedness of the athletes. This study provides new insights into acrobatic elements in the AG routines.

Key words: competition, code of point, elite athletes, acrobatics, aerobic gymnastics.

Introduction

Aerobic Gymnastics (AG) is a kind of sport in which athletes perform continuous complex and high-intensity aerobic movement patterns to music, which originates from traditional aerobic exercises. The AG routine, which athletes perform, must demonstrate continuous movement, flexibility, strength and the use of the seven basic steps, with perfectly executed difficulty elements ("Code of Point", 2017). Aerobic gymnastics is a kind of sport which combines elements of rhythmic and artistic gymnastics, acrobatics and sports choreography. Here lies the peculiarity of this sport.

Since 1995, the development of aerobic gymnastics has been under the guidance of the European (UEG) and World Federations (FIG), which hold judicial seminars, European, World Championships and other international competitions. The Technical Committee of International Federation Gymnastics modifies the competition rules every 4 years to increase the entertainment of the competition in aerobic gymnastics (Jemni, Sands, Friemel, Stone, & Cooke, 2006; Mehrtash, Rohani, Farzaneh, & Nasiri, 2015). Xin-jun & Zai-zhen (2005), Ding & Ma (2005), Manzheley & Chayun (2018) indicate that modifications to competition rules may lead to significant changes in the training process. The training process requires changes due to modified of the Code of Point (COP) and competitive activities of AG athletes.

AG athletes should ideally perform elements of difficulty in combination with dance moves, aerobic movement patterns and lift at any competition for 80 seconds (Bota & Lautarua, 2016). AG routines represent seven categories: Individual Women (IW) and Men (IM), Mixed Pair (MP), Trio (TR), Group (GR), Aerobic dance and Aerobic step. Each routine is assessed according to the Artistic, Execution and Difficulty. Artistic contains five criteria, each of which is equal to two points: music and musicality, aerobic content (Aerobic Movements Patterns - AMP), General content ("G+"), space and artistry. Judges of Execution evaluate the Technical Skills of elements, AMP, transition and linking, lift, partnership and collaboration, synchronisation. Judges of Difficulty evaluate the difficulty elements in a routine of competitors according to the minimum requirements. In order to get a good assessment (8.5 and more) in Artistic and Execution, it is necessary to compose each part of the routine and to perform it with small deviation from perfect performance. However, the complexity of the ideal execution of the whole routine lies in the specificity of the functional changes occurring in the body during the performance of the routine.

During the first seconds of the performance, the aerobist's pulse reaches 180-200 beats per minute, which leads to a sharp increase in blood lactate. Therefore, AG athletes perform a routine in the sixth training zone, which indicates anaerobic capacity (Coggan, 2003; Sands, Friemel, Stone, & Cooke, 2006; Heller & et. al., 2008). The researchers, who studied athletes' aerobic gymnastics, have confirmed the fact of anaerobic energy supply and recommended coaches to pay attention to anaerobic capabilities of AG athletes. For example, H.Kikuchi (2012) showed that after 2/3 of the routine, AG athletes continue to perform it having the pulse more than 90% of the maximum, and the maximum blood lactate was between 9 and 14 mmol/l by the end of the routine. M.Mineva (2012) from Bulgaria has recently conducted research on the athletes of the national youth team of the country aged 12-14 years. The study identified the blood lactate concentration after a double of routine. After that, the researcher measured blood lactate at the third, ninth and fifteenth minutes of the recovery period. At the third minute after performing double load the average lactate indexes were 6.65 mmol/l. These indexes correspond to anaerobic energy capacity during performing of AG routine. Y. Song (2012) also attempted to evaluate the recovery process of AG athletes 10 minutes later after performing of routine. The values of the lactate test in the morning showed that they were higher in men comparing to women. In the afternoon, the test showed that values of the lactate test of male athletes were higher comparing to female athletes 15 minutes later after the recovery. L. Righetti (2004) studied options that could minimise the increase in lactate during of AG routine. The Italian researcher concluded that the irrational arrangement of the difficulty elements affected the athlete's condition, which may lead to the non-fulfilment of the necessary elements at the end of the routine. To avoid this situation, it is essential to make the routine variable, in other words, the positions of the elements should be changed in the AG routine depending on an individual athlete and his or her technical skills. Based on the data obtained, we can say that anaerobic training is an effective tool in aerobic gymnastics. Moreover, Code of Points (COP) allows AG competitors to participate in competitions in several categories. Thus, the speed of recovery is important in aerobic gymnastics. Therefore, compliance with the distribution of work and rest is a significant factor that contributes to the excellent performance of the routine and the prevention of injuries of AG athletes.

Some researchers (Kadir et.al, 2018) considered that the effects of exercise once or three times a week for 6-8 year-old children had positive changes on the mental and motor abilities of the children. Thus, the curriculum of trainees should include more exercises with physical activity.

To improve athletes' skills, significant changes in the AG training process can include using information technologies (Mariana & Orlando, 2014). Some scholars (Mezei, Teodorescu & Bota, 2017) examined the usage of information technologies during the training process of aerobic gymnastics, which allowed collecting accurate information on biomechanical parameters of movements when performing C.105 2/1 Air Turn in variation end positions. They proved that using modern technologies provides a more rigorous control of variables that reflect biomechanical characteristics of movements, which leads to reducing training time when learning new elements. Besides, Y. Zhou (2017) introduced the Moodle-based podcast into the educational process of Nanjing Xiaozhuang University to increase the effectiveness of teaching aerobic gymnastics movements based on the method and device for generating animation in real time. In order to emphasise the kinematic characteristics of certain technical elements performed by elite athletes, Xsens MVN Motion Capture was developed (Bota, Mezei & Bidiugan, 2014). This equipment allows finding errors in movements of an athlete when performing complex coordination elements.

The mentioned above studies show that significant correlation exists between the training process and the modification of the competition rules. The COP in aerobic gymnastics is modified by the Technical Committee of the International Gymnastics Federation every four years. Acrobatics has become the part of AG routine since 2012. In AG COP until 2012, acrobatic elements were prohibited and their performance in a routine led to 1-point penalty. However, at the World Championships 2016, acrobatic elements began including in AG routine, but judges did not evaluate these elements. Nowadays, the competitions rules 2017-2020 allow performing acrobatic elements and obtaining additional points in difficulty. The current situation should undoubtedly increase motivation of athletes and coaches to train acrobatic elements.

Much of the current AG researchers pay particular attention to the optimisation of a training process and increase sport skills of athletes. However, there has been little discussion about acrobatic training in aerobic gymnastics. Research on this topic has not ever been conducted because earlier requirements to perform acrobatics elements were not presented to AG athletes. This study provides new insights into acrobatic elements in the routines of elite AG athletes. This research addresses finding answers to the following research questions: Which acrobatic elements are really necessary to be included in a routine? What is the rationale behind using these elements? How can acrobatic training be integrated in the training process?

This paper attempts to show the significance of integrating acrobatic preparedness into the training process of AG athletes to make the athletes more competitive at World Championships. The objectives were to identify which acrobatic elements were used in the routine of the finalists of the first Aerobics Gymnastics World Championships (2018), to analyse the content of the finalists' routine performed in accordance with the modified rules of the new Olympic cycle 2017-2020. Besides, we found out all the varieties of acrobatic elements used by athletes to decorate their routines. Then, we integrated identified varieties of acrobatic elements into the training process AG team of Tyumen, Russia.

Material & Methods

Our study included five stages:

1. To identify the types of acrobatics in aerobic gymnastics used in routine at the 2018 Aerobic Gymnastics World Championships, we observed eight video episodes of the final routines at the 2018 aerobic gymnastics World Championships in five categories (IW, IM, MP, TR, GR) according to the COP ("Code of Point", 2017). The only way to learn the routines and scientifically substantiate their content was to observe video analysis. At the World Championships 2018, the category of Individual men (IM) was presented by eight competitors from Japan, Hungary, Mexico, Korea, Brazil, China, Bulgaria and Russia. The category of Individual women (IW) was presented by eight competitors from Japan, Russia, Italy, Spain, Italy, Bulgaria and Korea. Category of Mixed pairs (MP) was presented by eight competitors from Italy, Romania, Hungary, Bulgaria, Russia, Korea and China. The category of Trios was presented by eight competitors from Russia, China, Romania, Hungary, Korea and Vietnam. The category of Groups was presented by eight competitors from China, Romania, Russia, Vietnam, Italy, Bulgaria, Korea and France.

2. To determine the number of acrobatic elements used in different parts of the AG routine the most common acrobatic elements used of the AG routine at the 2018 World Championships, we ticked the acrobatic elements performed by each athlete in the table with all the possible acrobatic elements at the competitions while viewing the finalists' performances.

3. To identify the duration of performance "G+" and Lifts of the finalists at the 2018 World Championships, we investigated the duration of "G+" and Lifts in each category in aerobic gymnastics with the help of a stopwatch and the dependence of the duration of the performance of "G+" and the successful performance of an athlete.

4. To observe the dynamics of acrobatic elements performance, we compared acrobatic elements used in AG routines at the 2016 and 2018 World Championships. At the World Championships 2016, the category of Individual men (IM) was presented by eight competitors from Japan, Hungary, Mexico, Korea, Russia, Korea, Italy and France. The category of Individual women (IW) was presented by eight competitors from Romania, China, France, Italy, Argentina and Korea. The category of Mixed pairs (MP) was presented by eight competitors from Italy, Hungary, China, Japan, Russia, Romania, Bulgaria and Spain. The category of Trios was presented by eight competitors from Korea, Japan, Russia, Romania, Spain and France. The category of Groups was presented by eight competitors from China, Italy, Romania, Hungary, France, Thailand, Russia and Korea.

5. To make AG athletes more competitive, we designed the annual training cycle with an emphasis on the acrobatic technical preparedness of the AG team of Tyumen, Russia.

Results and discussion

After the first viewing of the final routines, we found out that acrobatic elements were used to obtain points in different parts of routines. Therefore, we classified the performance of all acrobatic elements in aerobic gymnastics into three types: acrobatics of Artistic, acrobatics of Difficulty and acrobatics of Lifts.

Acrobatics of Artistic includes acrobatic elements which combining with a variety of jumps or transitions allow the athlete to meet the requirements for the General Content (G+) in Artistic. One "G+" is equal to the combination of coordination, dynamic and unpredictable movements. In order to get a maximum of two points in the general content criteria, an athlete must perform four "G+". In addition, acrobatics of Artistic can be described a non-classical performance of acrobatic elements with an additional rotation or a modified final position. Acrobatics of Difficulty includes acrobatic elements, which allow an athlete to get additional points in the combination of difficulty elements. For example, an athlete gets an additional 0.1 point for performing an acrobatic element in combination with one element of difficulty, and an athlete gets 0.2 points for performing an acrobatic element in combination with two elements of difficulty.

Acrobatics of Lifts is part of the mandatory content of group AG routines, in which it is also possible to perform gymnastic and acrobatic elements which are equally scored.

Table 1 demonstrates the number of acrobatic elements in the routines in acrobatics of Artistic at the 2018 World Championships. As can be seen from the table, the majority of the athletes included acrobatic elements into the general content.

Table 1 – The number acrobatic of "G+" at the 2018 World Championships

Score		Categories	IW (n=8)	IM (n=8)	MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Artistic (General content)	Without acrobatics		3	3	12	5	3	5.2±3.9	0.8
	%		9.4	9.4	37.5	15.6	9.4		
	With acrobatics		29	29	20	27	29	26.8±3.9	0.8
	%		90.6	90.6	62.5	84.4	90.6		

The obtained results proved that both in individual and group routines acrobatic elements were used to a greater extent for the general content in Artistic. It is evident that the number of “G +” with the use of acrobatic elements exceeds the number of “G +” without using them. In the categories of Individual men and women, the number of “G +” was the same with and without acrobatics 90.6% and 9.4%, respectively. However, as can be seen from the table, comparing the finalists of the category “MP” with other categories, it is worth noting that maximum of “G +” were performed without acrobatics. Mixed pair athletes performed more dancing, partner movements with collaborations and jumps to display the plot of the routine. The results obtained confirmed the fact that acrobatics used in AG routines by elite athletes was more oriented towards Artistic. “G +” with the use of acrobatic elements objectively exceed the amount of “G +” without acrobatic elements. The results also showed that each finalist performed the maximum number of “G +” equal to four.

Table 2 demonstrates the number of acrobatics and elements difficulty combination at the 2018 World Championships. In individual routines, athletes had to perform ten elements of difficulty, and mixed pairs, trios, groups had to perform nine elements of difficulty.

Table 2 – The number of acrobatics and elements difficulty combination at the 2018 World Championships

Score		Categories	IW (n=8)	IM (n=8)	MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Difficulty	Without acrobatics		79	78	70	70	70	73.4±4.7	0.9
	%		98.7	97.5	97.2	97.2	97.2		
	With acrobatics		1	2	2	2	2	1.8±0.4	0.1
	%		1.3	2.5	2.8	2.8	2.8		

As shown in Table 2, the finalists in the IM, MP, Trios and Groups performed two combinations of acrobatics elements and difficulty elements comparing to the finalists of IW who performed one combination.

Table 3 presents the number of Lift with acrobatics elements at the 2018 World Championships. Individual routines did not include lifts, but group routines had to include one lift, in which the main requirement was to raise the partner above the shoulder level.

Table 3 – The number of Lift with acrobatics elements at the 2018 World Championships

Score		Categories	MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Lift	Without acrobatics		6	6	6	6±0	0
	%		25	25	25		
	With acrobatics		18	18	18	18±0	0
	%		75	75	75		

What is striking about the figures in this table is the same number of lifts with and without acrobatics elements for all categories. Thus, six lifts without acrobatics and 18 lifts with acrobatics elements were performed by the finalists of each category.

Table 4 specifies acrobatic elements in the general content which were performed in the routines of each category.

Table 4 – Acrobatic elements in Artistic in competition programmes at the 2018 World Championships

Acrobatics elements		IW (n=8)	IM (n=8)	MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Roll	number	21	12	12	13	18	15.2±4.1	0.8
	%	35	24.5	38.7	23.2	34.6		
Handstand	number	12	12	4	11	4	8.6±4.2	0.8
	%	20	24.5	12.9	19.6	7.7		
Cartwheel	number	4	12	7	8	15	9.2±4.3	0.9
	%	6.7	24.5	22.6	14.3	28.8		
Walkover	number	2	2	4	5	8	4.2±2.5	0.5
	%	3.4	4.1	12.9	8.9	15.4		
Round off	number	2	2	0	7	0	2.2±2.9	0.6
	%	3.4	4.1	0	12.5	0		
Flic flac	number	10	5	2	5	2	4.8±3.3	0.7
	%	16.7	10.2	6.5	8.9	3.8		
Kip up	number	5	1	0	1	0	1.4±2.1	0.4
	%	8.3	2.0	0	1.8	0		
Salto	number	4	3	2	3	5	3.4±1.1	0.2
	%	6.7	6.1	6.5	5.4	9.6		
Handspring	number	0	0	0	3	0	0.6±1.3	0.3
	%	0	0	0	5.4	0		

Thus, the results showed that the athletes in each category most often performed a roll. While observing the video, we identified the most common rolls such as back, forward, over the shoulder, in a handstand, in a push up position, in a squat on the one leg, on a thigh, crouching, sitting on a heel, dive roll. The other common acrobatic elements were handstands with a turn, with flapping legs, on one hand, sitting inlegs apart, in a squat on one leg, in the emphasis lying on the thighs and cartwheels on one hand, with a stroke of a leg, into a twine, into a seat, at rest lying, at rest lying on hips, with a turn, from a stand on a knee, a jump, a barrel.

Most often in routines, men used a roll, which makes up 35% of the total number of acrobatic elements in an individual category, handstand in 20% and flak in 16.6% of cases. In AG routines of women, three acrobatic elements such as rolls, handstand and a cartwheel made up the same percentage 24.5%.

Round off and walkover were used less often in category IW and IM. The walkover backward performed only once in the final, as it was not considered as a dynamic routine. Besides, men rarely performed the cartwheel, as they are able to perform more complex and attractive acrobatics elements.

In the performances of mixed pairs, the finalists most often performed roll, which amounted to 38.7 %, the cartwheel 22.6 %, handstand and a walkover of 12.9% of the total number of acrobatic elements performed.

Only in the trio, the athletes performed the acrobatic element round off, the handspring forward in collaboration with the support of the partner and kip up, which contributed to the largest number of acrobatic elements in group categories.

In the category's MP and Groups, three acrobatic elements were not observed: round off, kip up and handspring. We can assume that the absence of kip up and handspring might be related to the complexity performance of these elements.

According to Table 5, the finalists of MP, Trios and Groups preferred to perform "flic flac" and "round off" in combination with two elements of difficulty.

Table 5 – Acrobatic elements in Difficulty in competition programmes at the 2018 World Championships

Acrobatics elements		IW (n=8)	IM (n=8)	MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Round off	number	0	0	1	1	1	0.6±0.5	0.1
	%	0	0	50	50	50		
Flic flac	number	1	2	1	1	1	1.2±0.4	0.9
	%	100	100	50	50	50		

From the Table 6, it can be seen that by far the greatest demand is for three acrobatic elements (Cartwheel, Walkover, Salto) used in Lifts. It should be pointed out that in the category of Groups AG athletes performed only one acrobatic element Salto.

Table 6 – Acrobatic elements in Lifts in competition programmes at the 2018 World Championships

Acrobatics elements		MP (n=8)	Trios (n=8)	Groups (n=8)	X±σ	m
Cartwheel	number	2	1	0	1±1	0.4
	%	25	14.3	0		
Walkover	number	3	2	0	1.7±1.5	0.5
	%	37.5	28.6	0		
Salto	number	3	4	7	4.7±2.1	0.7
	%	37.5	57.1	100		

Figure 1 shows the duration of performance of all four "G +" in individual routines.

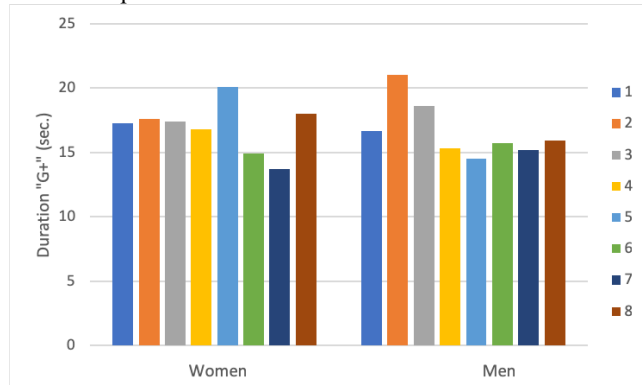


Figure 1. Duration of "G +" in the individual programmes at the 2018 World Championships

As can be seen from the graph, the female winners of the first three places spent more or less the same amount of time of the total duration of the AG routine to complete all "G+", 20.6%, 21.2% and 21.5%,

respectively. On the contrary, the male winners of the first three places spent different amount of time to complete all "G+", 19.9%, 25.3% and 22.1% respectively.

Figure 2 shows the duration of performance of all four "G +" in group routines.

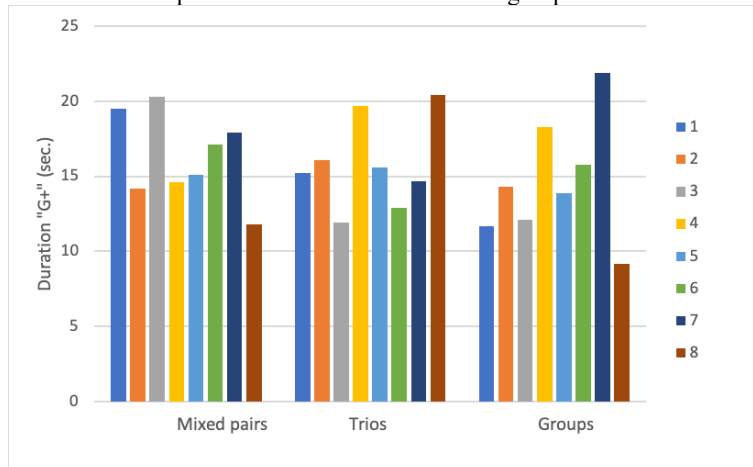


Figure 2. Duration of "G +" in the group programmes at the 2018 World Championships

It shows that the AG athletes in the category MP ranked of the first three places spent different amount of time to complete all "G+", 22.9% 16.9% and 24.5%, respectively. The winners in the category Trio spent different amount of time to complete all "G+", 19.9%, 25.3% and 22.1%, respectively. The AG athletes in category Groups ranked of the first three places spent time to complete all "G+", 14.5% 17.0% and 13.5% respectively. We can conclude that different amount of time to complete all "G+" might not be a significant impact indicator of the successful performance in each routine.

Table 7 compares the number of acrobatic elements in each category at the World Championships in 2016 and 2018.

Table 7 – Comparative analysis of the number of acrobatic elements at the world championships of 2016 and 2018

Year \ Rank	1	2	3	4	5	6	7	8	X±σ	m	Significance of Differences
IM											
2016	3	2	4	2	3	5	5	4	3.5±1.2	0.2	p <0.05
2018	5	7	8	5	5	4	7	8	6.1±1.6	0.2	
IW											
2016	3	4	7	5	3	4	5	3	4.3±1.4	0.2	p <0.05
2018	5	6	9	8	6	6	10	10	7.5±2	0.3	
Mixed pairs											
2016	5	4	4	1	3	1	3	3	3±1.4	0.2	p >0.05
2018	3	4	6	4	2	3	6	3	3.9±1.5	0.2	
Trio											
2016	2	5	2	6	5	5	2	3	3.8±1.7	0.2	p <0.05
2018	5	11	4	9	6	6	11	4	7±2.9	0.4	
Groups											
2016	4	2	3	5	2	5	4	5	3.8±1.3	0.2	p <0.05
2018	7	5	7	6	8	6	10	3	6.5±2.1	0.3	

As shows in Table 7, the finalists in the categories of IM, IW, Trios and Groups performances at the World Championships in 2018 have significantly increased (p < 0.05) the number of acrobatic elements compared to at the World Championships in 2016.

What is interesting about the data in this table is that the finalists in the categories of MP have not significantly increased (p < 0.05) the number of acrobatic elements performed at the World Championships in 2016. The fact can be explained that the AG choreographers and athletes, while drawing up the routine, do not focus on its complexity but focus on creating the image and plot of the routine.

Group categories must necessarily contain a lift, which is estimated according to the new rules of 2017–2020 and gives an additional bonus (up to 1.0 point) to the total score. Table 8 below illustrates the duration and evaluation of lifts in group categories at the World Championships 2018.

As can be seen from the Table 8, the finalist of the group's routines spent more or less the same amount of time of the total duration of the AG routine to complete one Lift, 12.1%, 11.4% and 11.5%, respectively.

Table 8 – Duration and evaluation of acrobatic Lifts in group categories at the World Championships – 2018

Criteria \ Rank	1	2	3	4	5	6	7	8	X±σ	m
Mixed pairs										
Duration of lift, sec.	11	9.5	10.3	8.1	9.6	10.9	11.1	10.4	10.1±1.0	0.1
Duration / total time, %	12.9	11.3	12.4	9.8	11.4	13.1	13.2	12.5	12.1±1.2	0.2
Score of lift, point	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Trio										
Duration of lift, sec.	9.8	9.7	9.0	10.8	9.9	10	10	7.4	9.6±1.0	0.1
Duration / total time, %	11.7	11.5	10.7	12.9	11.9	12	11.9	8.9	11.4±1.2	0.1
Score of lift, point	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9		
Groups										
Duration of lift, sec.	7.9	10.1	10.1	9.9	8.4	9.6	9.8	11.5	9.7±1.1	0.1
Duration / total time, %	9.4	11.9	12.2	11.8	10.1	11.4	11.7	13.5	11.5±1.3	0.2
Score of lift, point	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8		

The data shows the importance and significance performance of acrobatic elements in a modern AG routine. Before drawing up a plan for the 2016-2017 annual preparation of the team of Tyumen, Russia, we assumed that changes in the rules of the competition relate to the acrobatic component. Therefore, we began to introduce the acrobatic preparation in the training process of AG athletes.

We assessed the level of acrobatic technical preparedness of AG team of Tyumen, Russia. The participants were 10 men and 31 women aged 18-28. They had to perform the following acrobatics elements: Cartwheel, Round off, Walkover (forward and backward), Headspring, Handspring, Flic flac, Salto (forward, sideward and backward). Each acrobatic element was assessed by seven-point scale presented in Table 9.

Table 9 – Criteria of assessment acrobatic elements

Point	1	2	3	4	5	6	7
Level	Very low	Low	Below average	Medium	Above average	High	Very high
Types errors	Unacceptable	2 mediums	1 medium	Complex small	2 smalls	1 small	Without

As a result of the initial testing of acrobatic technical readiness of the men of the team of the city of Tyumen, Russia, it was revealed that 20% of the athletes had a very low level in the overall score, 20% - low, 20% - above average. This result can be explained by the lack of acrobatic preparations in the previous training process. The coaches were given some recommendations and proposed a structure of the training process with an emphasis on the development of acrobatic technical preparedness presented in Table 10.

Table 10 – The structure of the annual training cycle with an emphasison the development of acrobatic technical preparedness

Mesocycle	Month	Objective
General	August, September, October	<ul style="list-style-type: none"> Study of the level of physical preparedness; Drawing up of training plan with a focus on improving the acrobatic preparedness; Study of the level of acrobatic technical preparedness; Retrospective analysis of the technique of performing the elements of the best athletes in the world; Training of acrobatic elements in lightweight (gymnastic carpet, trampoline, using safety systems) conditions.
Specific preparation	November, December	<ul style="list-style-type: none"> Improvement of acrobatic elements in AG hall; Training in acrobatic elements in combinations with elements of difficult.
Pre-competition	January	<ul style="list-style-type: none"> Bringing the level of reliability of acrobatic elements at least 8 times out of 10.
Competition	February, March, April	<ul style="list-style-type: none"> Maintaining the level of reliability of performance of acrobatic elements.
Transitional	May, June, July	<ul style="list-style-type: none"> Providing optimal conditions for the recovery processes of the body; The use of active recreation.

The results improvement of intermediate assessment in December 2016 showed that 16.7% of athletes had a very low level, 50% below average, 16.7% average, 16.7% above average.

Thus, 16.7% of AG athletes began to correspond to a low level, below average, above average, high, and 33.4% average level.

As a result of the initial testing of the technical training of women of the national team of the city of Tyumen, it was revealed that 35.3% of the athletes had a very low and low level, 11.8% below the average and average level, and 5.9% above the average.

A lagging acrobatic element was a back flip, which no one athlete was able to perform. The average increase was 29.6% due to the development of two women athletes' acrobatic elements "flic flac" and "salto backward".

After applying structure of the annual training cycle with an emphasis on the development of acrobatic technical preparedness, testing athletes revealed positive changes in the level of preparedness of female athletes. Thus, 29.4% began to correspond to a very low level, 23.5% to a low and below average, 17.6% to an average, 5.9% to above an average as shown in figure 3, 4.

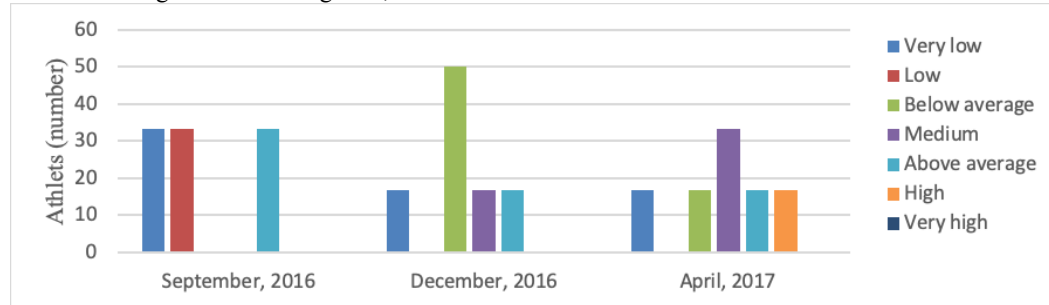


Figure 3. Monitoring of the level acrobatic technical preparedness in men

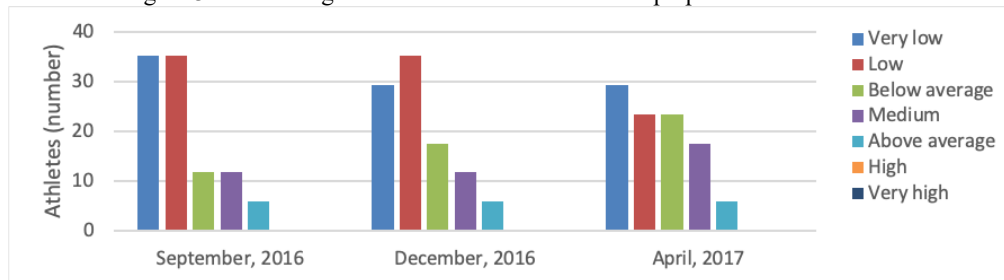


Figure 4. Monitoring of the level acrobatic technical preparedness in women

Today, we continue to modify the training process in the AG team Tyumen, Russia in accordance with the findings of this study. We modified a training programme including common acrobatic elements which can contribute to impacting acrobatic preparation and as a result, to successful performance at the national and world competitions.

Conclusions

The study has shown that the successful performance of elite AG athletes is characterised by variable performance of acrobatic elements. We identified the most common acrobatic elements: rolls such as back, forward, over the shoulder, in a handstand, in a push up position, in a squat on the one leg, on a thigh, crouching, sitting on a heel, dive roll.

According to the new aerobic gymnastics' COP ("Code of Point", 2017), AG athletes can receive additional bonuses performing acrobatic elements. We revealed that acrobatic elements were used to obtain points in different parts of routines. Therefore, we classified the performance of all acrobatic elements in aerobic gymnastics into three types: acrobatics of Artistic, acrobatics of Difficulty and acrobatics of Lifts.

The data obtained about identified common acrobatic elements and the lack of relationship between the duration of "G +" and the rank at the competition allow making the training process more effective. The experience of integrating the annual training cycle with an emphasis on acrobatic technical preparation of AG team of Tyumen, Russia, might be of special interest to international coaches to optimise the training process in their teams in order to make AG athletes more competitive.

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