



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 5.38  
IJPESH 2017; 4(6): 125-129  
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www.kheljournal.com  
Received: 22-09-2017  
Accepted: 23-10-2017

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## The initial application for selection test on morphology for female gymnastic athletes of the age of 7

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### Abstract

Basing on the basis of genetic, morphology, gymnastic characteristics and having reference on selection scientific achievements in the countries on the world, results of expert interviews. So, we has initially applied 05 tests and selection criterion of Chinese morphology to be used in selecting Vietnamese female gymnastic athletes of the age of 07 (by the bone age).

**Keywords:** Initial application, morphology, female gymnastic athletes

### Introduction

The gymnastic is one of sports with the techniques of variety, complication, length - the proportion of the limbs and parts of the body that directly affect the effectiveness of the movements, at the same time affecting to make technique and development of difficult movements. In addition, the morphology also shows the aesthetic of movement.

Most of the morphological parameters reserve high genetic (eg: female height 92% - male 85%, female arms length 87% - male 80%, female legs length 92% - male 77%...). So that, the modification in training is very difficult (the percentage of modification is very low). Therefore, the selection of gymnastic athletes and morphology play an important role that we need to be careful attention and select strictly.

### Methodology, Researching Organization

In the process of researching, the theme have applied analysis synthesizing method together with some related documents, checking anthropometry and statistical method. The participants consisting of 20 female gymnastic athletes of the age of 07 (by the bone age).

### Researching Results

Starting from the characteristics and requirements of the gymnastic, at the same time by some morphological characteristics: the Chinese and Vietnamese have many similarities (for example, the average height of gymnastic athletes, the ratio of hands' length-height, hip/shoulder width ratio...). In addition, the genetic inheritance plays a leading role to the initial selection stage (including of morphological characteristics). Therefore, we have selected the evaluation criteria of China to apply in the selection of morphology of Vietnamese female gymnastic athletes of the age of 7.

In order to ensure objectivity and science, the theme has conducted to have interviews with experts in local on the application of this evaluation criteria. There are 45 questionnaires, agreement votes 37/45 (equivalent 82.2%). As such, the majority of experts has an approval to use Chinese evaluation criteria in the selection process of the morphology of female gymnastic athletes of the age of 6. The selection criteria are presented in the Table 1.

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**Table 1:** The selection criteria on morphology for female gymnastic athletes of the age of 07.

No	Test	Levels									
		1		3		5		3		1	
		Standard	Mark	Standard	Mark	Standard	Mark	Standard	Mark	Standard	Mark
1	Height (cm)	113~	0.5	115~	2.5	117~123	5.0	~125	2.5	~127	0.5
2	Weight/Height×1000 (g/cm)	151~	0.5	156~	2.5	161~171	5.0	~177	2.5	~184	0.5
3	Legs length B/Height ×100 (%)	49.4~	0.5	49.9~	2.5	50.4~52.4	5.0	~52.9	2.5	~53.4	0.5
Test		Level									
		1		2		3		4		5	
		Standard	Mark	Standard	Mark	Standard	Mark	Standard	Mark	Standard	Mark
4	Arms span-Height (cm)	-3.5~	1.0	-1.5~	2.0	0.5~	3.0	2.0~	4.0	3.0~	5.0
5	Width of pelvic front & upper/ Shoulder width ×100%	74.0~	1.0	72.0~	2.0	70.0~	3.0	68.5	4.0	67.5~	5.0

(Not displaying the level 2 and 4 of criteria 1,2 and 3)

(Excerpt from the document: Wang Jinping, Wang Bian (2011) - Nguyen Thi Gam, Science of Athlete Selection, People Sports Publishing House, Beijing.)

**Note:** The selection criterion has a maximum score of 25 points (each maximum score of 5 points), it is classified into 5 levels from 1 to 5: Level 5 - Excellent; Level 4 is good; Level 3 – well done; Level 2 - average; Level 1 - weak.

### Grouping the participants to research

Before testing, we classify to group basing on the athlete's physical fitness level. We have divided the participants into two groups (The group 1 is excellent and good athletes, the group 2 is average and well done athletes) by the evaluation criteria for female gymnastic athletes of the age of 7 by the

author Nguyen Kim Xuan in 2001.

### Testing morphology of female gymnastic athletes of the age of 7.

Testing results show in the Table 2.

**Table 2:** Testing results on morphology of Vietnamese female gymnastic athletes of the age of 7

No	Test	Parameters	7 years old		Difference	
			Group 1 (n=8)	Group 2 (n=12)	t <sub>t05=2.101</sub>	p
1	Height (cm)	$\bar{X}_{\pm S}$	119.04±2.27	124.1±3.49	3.22	<0.005
2	Weight/Height×1000 (g/cm)	$\bar{X}_{\pm S}$	165.68±6.66	174.09±5.13	3.29	<0.005
3	Legs length B/Height ×100 (%)	$\bar{X}_{\pm S}$	50.41±0.81	52.72±0.73	6.48	<0.001
4	Arms span-Height (cm)	$\bar{X}_{\pm S}$	1.98±0.08	0.21±0.11	9.66	<0.001
5	Width of pelvic front & upper/ Shoulder width ×100%	$\bar{X}_{\pm S}$	67.38±1.49	70.26±1.54	3.84	<0.005

Basing on the selection criteria in the Table 1 and the results of the test in the Table 2 prove that: the physical fitness index of the two groups is very different. Especially, it is the criteria of Legs length B/Height ×100 (%), Arms span-Height (cm). Each criteria is as follows:

**The height (cm):** The average height of group 1 is (119.04 ± 2.27) lower than the group 2 is (124.1 ± 3.49). The difference is statistically significant at the probability p0.005. According to the selection criteria, the group 1 reserves the average height index in the range (117 ~ 123cm-maximum score of 5 points). Group 2 has average height in the range (~ 125cm - 2.5 points). Although, the average height is lower, but the height of Group 1 is more suitable with gymnastic than the Group 1.

**The Weight / Height × 1000 (g / cm):** In the test, The group 1 also has an average value (165.68 ± 6.66) lower than the group 2 (174.09 ± 5.13). The difference was statistically significant at the probability p0.005. According to the selection criteria, the Group 1 has the Weight / Height × 1000

index within the range (161 ~ 171-maximum score of 5 points). The Group 2 has a weight / height × 1000 average in the range (~ 177-point 2.5). It shows that the group 1 with the height and weight is more suitable than the group 1.

The examination results of these two tests indicate that the athletes of group 1 (excellence and good) with the bodybuilding lower and smaller body building than the group 2 (average and well done athletes). It is suitable with the gymnastic features.

**Legs length B/Height ×100 (%):** The average value of group 1 (50.41 ± 0.81) is lower than the group 2 (52.72 ± 0.73). The difference was statistically significant at the probability p0.001. It indicates that the group 1's athletes (excellent and good) with the characteristic of longer legs than the group 2 (average and well done). The long legs make up the beautiful bodybuilding, creating the beauty of the body movement. However, there are some limits to other factors. Therefore, the index has some certain limit as shown in the Table 1. The group 1's athletes focus on the appropriate level, it is not too long or too short – the level 5 (50.4 ~ 52.4). The group 2 is

concentrated at the level 3 (~ 52.9). It shows that the index of group 1 is more suitable with gymnastic and so it has more advantages than the group 2.

**Arms span-Height (cm):** The higher index, the higher score. The group 1 with an average value ( $1.98 \pm 0.08$ ) is higher than the group 2 ( $0.21 \pm 0.11$ ). The difference was statistically significant at probability  $p < 0.001$ . According to the selection criteria, the average value of group 1 concentrates at the level 4 (2.0 ~) gain to 4 points. The group 2 with average values are between 2.5 and 2.5 (-1.5 ~ 0.5). The result shows that the group 1's athletes (excellent and good) has longer arms than the group 2 (average and well done). It is a good advantage for the gymnastic for movements on crossing the legs.

**Width of pelvic front & upper/ Shoulder width  $\times 100\%$ :** The smaller indexes, the higher scores gained. The results in the Table 2 shows that: the group 1 reserves the average value ( $67.38 \pm 1.49$ ), it is lower than the group 2 ( $70.26 \pm 1.54$ ). The difference was statistically significant at probability  $p < 0.005$ . According to the selection criteria, the average value of the group 1 is 5 (67.5 ~), reaching 5 points. The group 2

with average value is between 3 (70.0 ~) reaching to 3 points. It indicates that the group 1's athletes (excellent and good) with pelvis (hip) smaller than the group 2 (average and well done). It is in line with the body building requirements of gymnastic athletes.

From the tests results of the Table 2 shows that the morphological indexes of the two groups are very different. Especially, legs length B/Height  $\times 100$  (%) và Arm span-Height (cm). The group 1 (excellence and good) with body building structure is more conformable to gymnastic requirements than the group 2 (average and well done).

To achieve level and competition results in training depends on a lot of factors. But, the genetic inheritance factor is the basic foundation for all other factors. Thus, the group 01 has converged a suitable body building structure to the gymnastic which represents a greater advantage over the group 2.

In addition, in order to make more clearly the differences between the two groups of athletes, we has calculated and classified each athlete with the tests (basing on the calculation criteria in the Table 1). The classification results show in the Table 3.

**Table 3:** The results of morphology classification of Vietnamese female gymnastic athletes of the age of 07 of every test

No	Test	Group 1(n=8)					Group 2 (n=12)				
		Ex	Good	Welldone	Average	Weak	Ex	Good	Welldone	Average	Weak
1	Height (cm)	7	1	0	0	0	0	0	10	2	0
2	Weight/Height $\times 1000$ (g/cm)	3	5	0	0	0	0	0	4	8	0
3	Legs length B/Height $\times 100$ (%)	6	2	0	0	0	0	0	5	7	0
4	Arms span-Height (cm)	6	2	0	0	0	0	0	9	3	0
5	Width of pelvic front & upper/ Shoulder width $\times 100\%$	2	6	0	0	0	0	0	8	4	0

**The targe of height (cm):** The group 1 has 7/8 athletes with excellent achievements, 1/8 athletes with good achievements. The group 2 has 10/12 athletes with well done and 2/12 average athletes.

**The targe of Weight / Height x 1000 (g / cm):** The group 1 has 3/8 excellent athletes, 5/8 good athletes. The group 2 has 4/12 athletes with well done and 8/12 average athletes.

**The legs' length B / Height  $\times 100$  (%):** The group 1 has 6/8 athletes with excellent results, 2/8 athletes with good results. The group 2 has 5/12 athletes with well done and 7/12 average athletes.

**Length of air span-Height (cm):** The group 1 has 6/8

athletes of excellent achievements, 5/8 athletes of good achievements. Meanwhile, the group 2 has 9/12 athletes with well done and 3/12 average athletes.

**Width of pelvis front & upper / Width of shoulder  $\times 100\%$ :** The group 1 has 2/8 excellent athletes, 6/8 athlete with good. The group 2 has 8/12 with well-done athletes and 4/12 average athlete.

Thus, the fitness marks of the group 1 is good and excellent. There are no athletes at well done, average or weak level. The group 2 is average and well done and there is not any athlete of good and excellent.

Next step, we have compile to calculate average score of each group in each indicator. Synthesis and classification results are presented in the Table 4.

**Table 4:** The results of synthesis and classification on morphology of female gymnastic of the age of 07.

No	Test	Group 1		Group 2	
		Mark	Level	Mark	Level
1	Height (cm)	4.98	~ EX	3.15	Well done
2	Weight/Height $\times 1000$ (g/cm)	4.30	Good	2.73	Average
3	Legs length B/Height $\times 100$ (%)	4.95	~ EX	2.28	Average
4	Arms span-Height (cm)	4.96	~ EX	2.72	Average
5	Width of pelvic front & upper/ Shoulder width $\times 100\%$	4.60	Tôt	3.09	Well done
Total of marks (maximum 25 marks)		23.18/25		13.97/25	

The results of the evaluation in the Table 6 shows that the total of scores of 05 tests is the group 1 of 23.18 over maximum scores of 25. The group 1 is at 13.97 over the maximum scores of 25. Considering each criterion: The group 1 with 3/5 targets are close to excellent level, 2/5 are good level and the group 2 is 3/5 are well done and 2/5 are average

level. Thus, the excellent and good team with the morphological examination are concentrated in the 4 and 5 levels (good and excellent), the average and well done ones are concentrated in level 2 and 3 (rather average level). It indicates that the selection results in morphology are similar to the evaluation results of athletes. Thus, the evaluation

criteria that we have selected to be suitable with Vietnamese female gymnastic athletes of the age of 7. The result also proves: In terms of morphology, the athletes have good body building (appropriate) with gymnastic will achieve higher level. Beside that, the results of research also have highlighted the importance and impact of female gymnastic body building element training level and competition results.

### Discussion

Index: Height and weight / height ratio  $\times 1000$  indicate the average height and weight of the excellent and good groups are lower than the average and well done ones. But, Together with the selection criteria, the scores are higher. It is explained by professional requirements such as (the height of the training equipments as well as the requirements of movements in the gymnastic). Starting from the technical requirements as well as the aesthetics of movements. So, the female gymnasts are characterized by a compact body. Thus, the low-small body is characteristic of female gymnasts. However, the height also shows the aesthetics of movements, so, the selection avoids the athletes too low. (Average adult height of female gymnastic athletes are about 1.50m). The big genetic heights (85% for males, 92% for females), which means that the modification in training is very low, so it is very strict in the height selection. Moreover, not only it based on the current height, but also the height of the adult age should be aimed to select the appropriate height gymnastic athletes.

**In the index:** The length of legs B / Height  $\times 100$  and Length of arm span index-height, the research results show that the excellent and good group with longer limbs than the average and well done ones. This is due to the specialization of the body: two long arms are very important in training and gymnastic competition: Firstly, it enhances the body focusing in anti movements in association with the anti-legs movements in the free gymnastic exercises. Secondly, the long arms will create a large radius which is beneficial in jumping, oblique swings and free exercises. Thirdly, the long arms will create a large movement range increasing the aesthetics of movements. Therefore, the long arms is a great advantage for female gymnastic athletes. This is also one of the characteristics of female gymnastic athletes.

The length of legs for gymnastic athletes play an important role in terms of movement mobility and aesthetics. The long legs, nice movements, but if they are too long, it will affect the speed of running, it will be disadvantageous in the running of free exercises and jumping horse. In the selection, the length of legs should be moderate, the athletes has good jumping force with the index of long legs / height  $\times 100$  from 50 ~ 51%. The index of female gymnastic athletes is a bit higher.

**Index of Front & Upper pelvic / shoulder width  $\times 100$ :** The results of the research have shown that the good and excellent female athletes have narrow pelvic characteristics (small hip) than the average and well done ones. It is explained by the following rationale basis: Small pelvic parts are not only beneficial in jumping movements, but are mainly suitable to technical movement requirements (which are beneficial in spinning and acrobatic exercises, moving by vertical axis of the body) and aesthetics in gymnastic. In addition, the hips make the lower body more lightly, flexibly, it will be refined and more power-saving. Therefore, the narrow pelvic (small hip) is also an advantage and also the morphological

characteristics of female gymnastic athletes.

Basing on the above mentioned analysis, the good and excellent female gymnastic athletes have morphological characteristics are very different from those of average and well done. This is due to the technical requirements of the gymnastic: The technical performances of gymnastic is rich and complex, the body parts must participate in the movements (dynamic and static), body and four limbs, the length and proportion of body parts directly affect the performance of the movements, it directly affects the formation and development of the difficulty of movement technique. On the other hand, the aesthetic and on the other hand it is equally important to gymnastic. Deriving from the requirements and characteristics of gymnastic, the most prominent feature of female gymnastic body buildings is small low body, long limbs, narrow pelvis.

In addition to the criteria on form, the selection should combine the examination of the following morphological characteristics: The knees, ankles, wrists, hands, feet are not too big. The straight arms that it is not hand rolled or curved. Especially, when standing laterally, after stretching the elbow, the forearm is not curled behind more than 100. When standing face to face, after stretching all elbows, it pay specially attention to not choose that the forearm does not bend out beyond 150 and flexed arm. Straight legs, not curved "X", "O" or other malformations. Clavicle, shoulder blades develop normally, not deformed. Normal spine, no curved "S" or "C"..., small and flat kneecap, high arch. Asin tendon with anatomical analysis, short asinine tendon, the muscle length will increase, the mass of muscle will increase the muscle power in the jumping. Therefore, the selection of gymnastic players often choose the athletes with a relatively short and prominent asinine tendon. It is usually used by the index: the length of asinine / long legs A  $\times 100$  to indicate. The elite male gymnastic athletes with the index =  $45.37 \pm 3.74$ , female =  $47.78 \pm 4.07$  (according to the datas of 2011 by Zhang Xuanfu, China).

### Conclusion

Basing on the initial results of the morphological selection for Vietnamese female gymnastic female of the age of 07 that has been demonstrated through 5 tests and evaluation criteria presented in the Table 1, it is appropriate and applicable in the selection of Vietnamese female gymnastic athletes of the age of 7.

Through the research found out the specific uplink of the female gymnastic body building with low, narrow limbs. These are the special features that make the female gymnastic development ability.

The results also confirm that the morphological parameters are one of the important selection criteria for female gymnastic athletes (especially, it is in the initial selection stage). In addition, It is highly genetic factors and undergoing low modifications through training process. Therefore, the selection and attention should be carefully selected in this regard.

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