

Research and Construct Morphological and Functional Models for Vietnamese Premium Shooting Athletes with Content of 10 Meters - Air Pistols

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Abstract

Built a morphological and functional model for high-level Vietnamese shooting athletes with content of 10m pistols, including: 23 morphological indicators: Height (cm), Weight (kg), Quetelet Index (g / cm), Hand length (cm), Arm span (cm), index finger length (cm), Foot length H (cm), Hand width (cm), Shoulder width (cm), Width Elbow (cm), Knee Width (cm), Chest Width (cm), Chest Thickness (cm), Bust (cm), Arm Ring (cm), Stretched Arm Ring (cm), Forearm Ring (cm), Leg Ring (cm), Fat Under of Shoulderblade (cm), Fat under Subcutaneous of Triceps (cm), Abdominal Fat (cm), Leg Fat (cm), Somatype and 10 functional indicators: Cardiac performance index, Blood pressure (HA) max/min, Vital capacity (liters), EEG, Testosterone, Cortisol, Number of red blood cells (RBC), Hemoglobin concentration in the blood (Hb). Eye field, Heart rate. Test results of morphological and functional indicators of athlete H.X.V. has affirmed the objectivity, science and many indicators equivalent to high-class shooters in Asia and the world.

Keywords: function, model, morphology, senior athlete, shooting.

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1. INTRODUCTION

Shooting is one of the sports identified by the sports industry as a key sport invested and developed in our country for many years as well as now and in the future. At Rio De Janeiro Olympic, Brazil 2016, gunner Hoang Xuan Vinh is Vietnamese for the first time won gold medal of 10m air-shot gun content.

The senior athlete model is a combination of important characteristics that directly affect the purposeful training process. To achieve this, the factors of morphology, physiological functions, psychology, physical strength, tactical techniques ... are the linked chains creating a unified block to make sports performance.

High-level athletes models include many component models include morphology model, functions and physical models, tactical techniques and psychological models. In which the model of morphology and function plays a pioneering role and is the foundation of other component models. Therefore, the study on determining the morphological and functional model of the Vietnamese high-level shooter athlete is topical and urgent [1].

2. RESEARCH OBJECTS AND METHODS

Subject: Morphological and functional model of high-level shooter athlete.

Object of study: athlete H.X.V with the content of 10m air-shortgun.

Research methodology: The thesis has used the document synthesis and analysis method, the interviewing method, the modeling method, the biomedical method and the statistical mathematical method.

3. RESEARCH RESULTS AND DISCUSSION

3.1. Selection of indicators and tests to determine the model of a Vietnamese male high-level shooter with content of 10 meters - air pistols

To achieve this goal, the topic conducted 3 steps: Synthesize relevant studies -> develop interview cards -> conduct expert interviews 2 times (each time is 1 month apart) and check determine similarities between two interviews, -> select a system of typical indicators and test those indicators on our country's senior athletes.

On the basis of theory and practice, the topic has preliminarily selected 37 indicators, including 26 morphology and 11 functional indicators.

Morphology Index: There are 26 indicators including Height (cm), Weight (kg), Quetelet Index (g/cm), Hand Length (cm), Arm Span (cm), Arm Length (cm), Back Length (cm), Thigh Length (cm), Index Finger Length (cm), Leg Length H (cm), Hand Width (cm), Shoulder Width (cm), Elbow Width (cm), Knee Width (cm), Chest Width (cm), Chest Thickness (cm), Arm Ring Contraction (cm), Stretched Arm Ring (cm), Forearm ring (cm), Leg Width (cm), Fat under of Shoulderblade (cm), Lower Triceps (cm), Lower Abdominal Fat (cm), Lower Leg Fat (cm), Somatype

Functional index: There are 11 indicators including, Heart function index, Blood pressure (max / min), Vital capacity (liter), Eye field, EEG, Testosterone, Cortisol, Number of red blood cells (RBC), Blood Hemoglobin Concentration (Hb), VO2 Max, Heart Rate.

The topic interviewed 15 coaches, 27 experts, and longtime teaching instructors with experience in shooting with the aim of selecting a system of indicators to determine morphological and functional models for Vietnamese male high-level guns athletes. Out of 42 tickets distributed, 42 votes were collected. The research was conducted through detailed questionnaire interviews. Results of calculating the percentage of importance using test indicators are presented in Table 3.8. Conventional topics on the Likert scale 05 levels: 05: very important, 04: important, 03: normal, 02: less important, 01: not important.

The convention only takes the tests selected by experts, coaches and teachers with over 80% of the total score. After that, these tests were continued to test Wilcoxon to check the consistency between two interviews (the time between two interviews was 1 month apart). According to the convention, 30 indicators have been selected with the ratio chosen between the two times above 80%. According to Wilcoxon test results between two interviews there is a coincidence and stability (in other words, there is no statistical difference) between the 2 interviews with the significance level $p > 0.05$.

In summary: The results through 03 selection steps, ensuring logic and science, selected 33 indexes, specifically as follows:

Morphology: There are 23 indexes including

1. Height (cm): 95.25%
2. Weight (kg): 95.2%
3. Quetelet index (g / cm): 93.6%
4. Hand length (cm): 90.95%
5. Arm span (cm): 98.75%
6. Index finger length (cm): 88.1%
7. Foot length H (cm): 86.9%
8. Hand width (cm): 93.6%
9. Shoulder width (cm): 92.65%
10. Elbow width (cm): 90%

11. Wide pillow (cm): 89.5%
12. Chest Width (cm): 90.95%
13. Chest thickness (cm): 91.2%
14. Chest (cm): 89.25%
15. Shrink arm (cm): 91.65%
16. Arm circumference (cm): 90.75%
17. Forearm circumference (cm): 89.25%
18. Lower legs (cm): 89.75%
19. Fatty lines under the skin of the shoulder blade (cm): 88.1%
20. Fatty folds under the triceps (cm): 88.55%
21. Fatty lines under the belly (cm): 88.55%
22. Fatty lines under the legs (cm): 92.15%
23. Somatype: 91.65%

Function:

1. Cardiac performance index: 93.35%
2. Blood pressure (max / min): 90.7%
3. Vital capacity (liters): 91.7%
4. EEG: 98.6%
5. Testosterone: 92.4%
6. Cortisol: 91.4%
7. Red blood cell count (RBC): 87.6%
8. Hemoglobin concentration in the blood (Hb): 97.35%
9. Eye field (left - right): 88.1%
10. Heart rate: 88.55%

3.2. Determining the model of the Vietnamese male high-level shooter athlete the content of 10 meters - air pistols

The results of the examination of morphological indicators of the male high-level shooter in Vietnam with content 10m - air pistols are presented in table 1. as follows:

In terms of height, the Vietnamese high-level athletes content 10m - air pistols ranked second after Chinese athlete Pang Wei; higher than Franck Dumoulin of France and similar to Korean athlete Jin Jong - Oh and the Spanish shooting team.

The body weight of a high-level Vietnamese shooter is 82.5 kg. This result is worse than athlete Jin Jong - Oh of Korea, Spain team (87.38 ± 13.30) and equivalent to Chinese athlete Pang Wei (80kg).

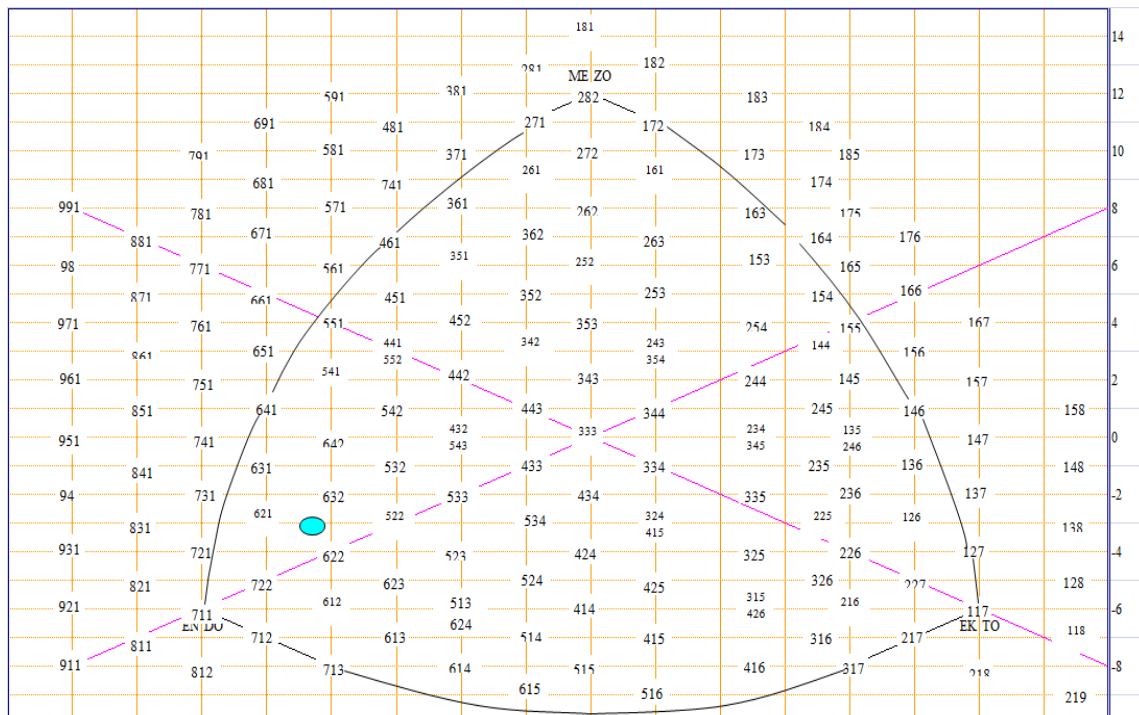
In comparing the test results of Vietnamese high-level athletes 10-meter - air pistols with high-ranking athletes from around the world who won the Olympic Summer Gold Medal from 2000 to present shows:

The Quetelet index (g / cm) of high-level Vietnamese shooter content 10m - air pistol (469.6) is higher than that of the elite Chinese shooter (385.4) (according to the Training Materials for Year Chinese coach of the China General Administration of Gymnastics and Sports 1999).

Table-1 : The results of testing the morphological indicators of male high-level shooter in Vietnam with content of 10m - air pistols

No	Index	Test results
1	Height (cm)	175.7
2	Weight (kg)	82.5
3	Quetelet index (g / cm)	469.6
4	Hand length (cm)	19.1
5	Arm span (cm)	184.5
6	Index finger length (cm)	7.4
7	Foot length H (cm)	97.8
8	Hand width (cm)	8.7
9	Shoulder width (cm)	43
10	Elbow width (cm)	7.0
11	Wide pillow (cm)	9.9
12	Chest Width (cm)	35.1
13	Chest thickness (cm)	21.8
14	Chest (cm)	101.5
15	Shrink arm (cm)	34.5
16	Arm circumference (cm)	32
17	Forearm circumference (cm)	27
18	Lower legs (cm): 89.75%	41.7
19	Fatty lines under the skin of the shoulder blade (cm)	14.4
20	Fatty folds under the triceps (cm)	7.9
21	Fatty lines under the belly (cm)	34
22	Fatty lines under the legs (cm)	23.2
23	Somatype	Endothelium

About the Somatotype index:

**Fig-1: The somatotype structure of male high-level Vietnamese shooter content 10m - air pistol on Heather Carter network**

Thus, the body of a male high-level shooter in Vietnam content of 10m - air pistol in endothelial region has a peak of 711, it is characteristic for the development of internal organs. Body features are pear-

shaped, round head, broad shoulders and hips, thicker than width, arm fat and thighs much. This shows that athletes will easily gain weight, quickly lose fitness if they stop exercising.

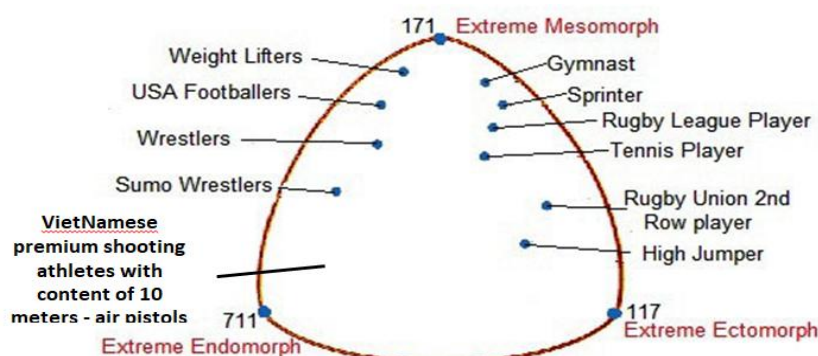


Fig-2: Average Somatotype structure of athletes in several sports
(Source: Brianmac Sports Coach 2015)

Through figure 1 and figure 2, we can see that the somatotype figure of male high-level shooter in Vietnam with content of 10m - air pistols is slightly different from other sports.

Based on many published studies, it can be concluded that somatotype indices in many sports are not homogeneous, even in elite groups of athletes of the

same level. Studies also show that differences in somatotype play an key role in the selection of talent for each sport. Peak athletes have differences in body composition and somatotype index when compared with normal people of the same age [3].

3.3. Determining the functional model of a high-level Vietnamese shooter in the content of 10m air pistols

Table-2: Test results of functional indicators of Vietnamese male high-level shooter 10m - air pistol

No	Index	Test results
1	Heart rate (times/minute)	56
2	Blood pressure - max/min (mmHg)	125/83
3	Cardiac function index (Hw)	8.8
4	Vital capacity (litre).	5.18
5	Electroencephalogram	Normal
6	Testosterone ($\mu\text{g/dL}$)	499.4
7	Cortisol ($\mu\text{g/dL}$)	9.20
8	Red blood cell count (RBC)	5.7
9	Blood hemoglobin concentration (g/dL)	17.0
10	Eye field (left – right)	$38^0 - 28^0$

The test shows that high-level Vietnamese shooting athletes's quiet circuit is 56 times/minute. This result is similar to elite Chinese shooters's.

According to professional requirements, while shooting, the athlete's heart rate must be in a slow state. People with cardiovascular and respiratory systems in good shape will be able to maintain a slow heart rate under high-pressure conditions.

But in fact, when shooting under pressure conditions will make the heart beat faster due to the increased stress and pressure placed on the body. If the heart rate is higher than normal in non-stress situations, it may increase rapidly during shooting. Once the heart rate increases, the respiratory rate also increases. Increased breathing and heart rate at the same time will have opposite effects that affect achieving maximum efficiency of the shot.

The heart function of the Vietnamese male high-level shooter with the content of 10m - air pistol is $((20 \times 4) + (28 \times 4) + (24 \times 4) - 200)/10 = 8.8$, reaching

the average category (according to the standard). Ruffier's taxonomy).

Blood pressure max/min is 125/83 mm/Hg. Thus, blood pressure is within the limits of normal healthy people.

Vival capacity: 5.18 liters is quite good. According to Chinese General Administration of Sports (1999), Elite shooters's vital capacity is higher than that ordinary people's.

The results of the EEG test of the Vietnamese male high-level shooter are as follows: Alpha wave rhythm: 8 - 9 (Hz) and Beta wave rhythm: 16 - 26 (Hz). Alpha wave frequency: athlete H.X.V. has an Alpha wave frequency of 8-9 (Hz), equivalent to a normal person with a wave frequency of 8-13 (Hz) (Ha Hoan Kiem, 2017). While this frequency of golfers is 10 - 12 (Hz) (Guy Cheron, 2016), of cyclists is 7.5 - 12.5 (Sebastian Ludyga) lower than the average person. Meanwhile, the Beta wave frequency of Vietnamese high-ranking male shooters is 16 - 26 (Hz) (2016),

equivalent to the average person with a wave frequency of > 13 (Hz) (Ha Hoan Kiem, 2017).), that of golfers is $14 - 30$ (Hz) (Guy Cheron, 2016), and that of cyclists is $12.5 - 32$ (Sebastian Ludyga, 2016) lower. Thereby we can see that athlete H.X.V.'s Alpha and Beta waves is equivalent to the average person and some other sports.

Regarding the RBC index, Vietnamese male high-level shooter in the 10m content - air pistol has similar properties to the Vietnamese archery team, the Hb index is within the reference range of the normal person.

The concentration of hemoglobin (HGB or Hb) in the blood of the Vietnamese male high-level shooter in the 10m air pistol content reached 17.0 g/dL. This stat is better than the average person and is comparable to the world's elite shooters.

Testosterone (ng/dL): This index in athletes H.X.V. is 499.4 ng/dL. Testosterone is a male hormone, a steroid derivative that contains 19 carbon atoms and is one of the body's major anabolic hormones. This hormone has a high rank in the regulation of metabolism. The increase or decrease of testosterone in the body causes a change in the capacity of the metabolic systems. And when the body is in a state of fatigue, the level of testosterone in the blood at this time has been reduced. This index of athlete H.X.V. similar to the great athletes.

Cortisol (9.20 μ g/dL): Cortisol stimulates glycogen synthesis, which is a sugar-metabolizing steroid. It has an effect on glucose metabolism, stimulates the creation of glucose from amino acids, and increases immunity, anti-inflammatory. Cortisol and ACTH are both excreted at 8 a.m., which can be explained as follows: During the half-daily rest period (after 1 hour to 2 am) there is activity of the CRH - ACTH - Cortisol system. It ensure the body has normal blood glucose levels before starting daily activities and before the first meal of the day. This index of the athlete is within the normal range.

The results of the eye field test of the Vietnamese male high-level shooter 10m - air pistol are as follows: Left eye: 380; Right eye: 280. Vision plays an important role in sports, for example good eyesight can help players focus on the ball and opponent, watch the ball move in the field, and observe the ball and and opponent at the same time within their eyesight. Eye exams (vision tests) are not generally done with athletes. Although many people (including optometrists, ophthalmologists) believe that an athlete's vision test is necessary to detect disease and have timely and specific treatment solutions. Thereby it can improve their performance [4].

Most people tend to focus on one eye more than the other. This phenomenon is known as monocular dominance (sometimes called dominant eye) and it can be relevant in several sports. With some sports such as shooting and archery, it is very important to determine the dominant eye when first checking technique. Athletes who play other sports may rely on one-sided vision too much, which means they will find it more difficult to see objects from the other direction of their body. This corresponds to peripheral perception (the ability to see objects within the field of vision). The results show that one-eyed dominance is a characteristic of shooters [2].

4. CONCLUSION

The research results have selected 33 indicators that determine the morphological and functional patterns of Vietnamese male high-level shooters in the 10m content - air pistols, including:

Morphology: There are 23 indexes including Height (cm), Weight (kg), Quetelet index (g / cm), Hand length (cm), Arm span (cm), Index finger length (cm), Foot length H (cm), Hand width (cm), Shoulder width (cm), Elbow width (cm), Wide pillow (cm), Chest Width (cm), Chest thickness (cm), Chest (cm), Shrink arm (cm), Arm circumference (cm), Forearm circumference (cm), Lower legs (cm), Fatty lines under the skin of the shoulder blade (cm), Fatty folds under the triceps (cm), Fatty lines under the belly (cm), Fatty lines under the legs (cm), Somatype.

Function: There are 10 indexes including Cardiac performance index, Blood pressure (max/min), Vital capacity (liters), EEG, Testosterone, Cortisol, Red blood cell count (RBC), Hemoglobin concentration in the blood (Hb), Eye field (left - right), Heart rate.

Test results of morphological and functional indicators of athletes H.X.V. affirmation of objectivity and science. Many of this athlete's stats are comparable to those of high-class shooters in Asia and the world.

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