The model characteristics of jump actions structure of high performance female volleyball players


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Annotation:
The purpose of this study was to develop generalized and individual models of the jump actions of skilled female volleyball players. The main prerequisite for the development of the jump action models was the results of our earlier studies of factor structure of jump actions of 10 sportswomen of the Polish volleyball team “Gedania” (Premier League) in the preparatory and competitive periods of the annual cycle of preparation. The athletes age was 22.0 ± 2.9 years, the sports experience – 8.1 ± 3.1 years, body height – 181.9 ± 8.4 years and body weight – 72.8 ± 10.8 kg. Mathematical and statistical processing of the data (the definition of M ± SD and significant differences between the samples) was performed using a standard computer program «STATISTICA 7.0». Based on the analysis of the factor structure of 20 jump actions of skilled women volleyball players determined to within 5 of the most informative indexes and their tentative values recommended for the formation of a generalized model of this structure. Comparison of individual models of jump actions of skilled female volleyball players with their generalized models in different periods of preparation can be used for a rational choice of means and methods for increasing the training process efficiency.

Keywords: female volleyball players, jump actions, model characteristics.

Introduction
The effectiveness of management training and competitive activities can be greatly enhanced through the development and use of different models to clarify the characteristics of athletic training. Generalized and individual models of athlete’s competitive activity and fitness are widely used for orientation and correction of the training process [1, 2, 3, 4, and 5].

In particular, models that characterize different aspects of fitness allow observing noticing the distinctive features of some outstanding athletes, evaluating their importance for achieving of high sport results, and following the dynamics of indexes reflecting the state of the physical qualities, which determine the success in a particular discipline as a whole, and of an individual athlete.

As noted by V. Platonov [6], the efficiency of use of such models is high in the preparation of young athletes, as well as adults who have not attained high sporting skills. Nevertheless, for the sportsmen of high qualification an analysis of individual model characteristics, in particular of qualitative characteristics and the structure of their motor actions, can be helpful.

In connection with the above the purpose of this study was to develop generalized and individual models of the jump actions of skilled women volleyball players.

Material and methods
The main prerequisite for the development of the jump actions models were the results of our earlier studies of the factor structure of jump actions of 10 sportswomen of the Polish volleyball team “Gedania” (Premier League) in the preparatory and competitive periods of the annual training cycle of preparation [7-10]. The athlete’s age was 22.0 ± 2.9 years, the sports experience – 8.1 ± 3.1 years, body height – 181.9 ± 8.4 years and body weight – 72.8 ± 10.8 kg. Mathematical and statistical processing of the data (determining M ± SD and significant differences between the samples) was performed using a standard computer program «STATISTICA 7.0».

Results and discussion
The presented in our paper [8] comparative analysis of the factor structure of 20 jump action of the Polish volleyball team “Gedania” in the preparatory and competitive periods of the annual training cycle of preparation [7-10]. The athlete’s age was 22.0 ± 2.9 years, the sports experience – 8.1 ± 3.1 years, body height – 181.9 ± 8.4 years and body weight – 72.8 ± 10.8 kg. Mathematical and statistical processing of the data (determining M ± SD and significant differences between the samples) was performed using a standard computer program «STATISTICA 7.0».
enabled distinguishing from among the twenty studied jump characteristics only five of the most informative indexes and assessment criteria, which are offered to use to create the optimal generalized and individual structure models of the jumping actions.

The basis for selection of these indexes was that they had the extra weight coefficients in the whole factor structure, as well as the fact that they both individually and in various combinations with each other can determine the diversity of factor structures depending on the level of sports volleyball skills, the training period, etc. These indexes and their assessment characteristics are as follows:

The maximum height of the hand touching the markup at a jump by push of two feet with one-step swoops. As in the competitive and in the preparatory periods of a one – year cycle this index is the most informative in the factors, the significance of which is determined, above all, a body length of female athletes. In drawing up the average model characteristics for the whole team and individual athletes characteristics, the value of this index in a generalized optimal model of jump actions may correspond to 300 cm;

The difference between the above indicator and the maximum height of touching the markup by hand extended upwards from the place (the actual height of the jump in attack). A high ratio value of this index in both periods of a one – year training cycle is set in the factors of which the efficiency of jumping action is due by interrelation of the actual jump height in attack with more pronounced involvement in jumping of the plyometric effect. The value of this parameter in the generalized optimal model of jump volleyball action may correspond the 60 cm;

The factors presented in the previous paragraph can serve to characterize the index of power in the vertical jump push of two feet after jump from the bench (W·kg⁻¹). Its value in the generalized optimal model of jump volleyball action may correspond to 33 W·kg⁻¹;

Figure. The team structure models of jump actions with the values of approximate indexes and its four individual models for women’s volleyball team “Gedania”

(Circumference – team model, — — individual model in the preparatory period of preparation; — — — — individual model in the competitive period of preparation; indexes “1” – “5” – described in the text)
Expressed as a percentage difference between the index “1” and an average height of touch the markup extended upwards by hand during performing consecutive 20 maximum vertical jumps by push off two feet with one step. In both periods of a one-year cycle this index is the most informative among the factors which we call factors of jump endurance. The value of this parameter in the generalized optimal model of jump actions for top-level female volleyball players can correspond to its 1% reduction;

Average \( W_{kg} \) in the test with 5 successive maximal vertical jumps by push off two feet on a strain-gauge track. This index is chosen to analyze the factors in which the volleyball jump action is characterized by resistance to manifestation of maximum explosive power in the vertical jump. Its value in the generalized optimal model of jump action corresponds to 1932 \( W_{kg} \).

The above criteria may be to use as guidelines in creating both the team and individual model characteristics of jump actions of skilled female volleyball players at different stages of their preparation (Fig.). It should be noted that only the rare athlete of high sports skill on their data corresponds to the «averaged ideal.» An illustrative example of such variation is shown in the figure above, which depicts individual characteristics of jump action of four female volleyball players from “Gedania” team in comparison with the generalized model. An analysis of such a variation creates favorable conditions for an individual approach to the organization of athletes jump training.

A general scheme of the study and the obtained data are recommended to be used during research on related team sports in which the effectiveness of jump actions is given considerable importance.

**Conclusion:**

1. A grounded approach and the proposed criteria to the formation as generalized and individual models of the jump actions structure of high performance women volleyball players, which is based on the results of factor analysis of these actions.

2. The presented data are recommended to be used in the preparation of volleyball teams and as well as in research on related team sports in which the effectiveness of jump actions is given considerable importance.

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