

APPLICATION OF METHODOLOGICAL APPROACH TO SELECTION OF SPORTSWOMEN TO CALISTHENICS TEAMS FOR GROUP EXERCISES, CONSIDERING COMPATIBILITY FACTOR

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Abstract. *Purpose:* motivation of methodological approach to selection of sportswomen to calisthenics teams for group exercises considering compatibility factor. *Material:* in the research 40 high qualification sportswomen of 17-23 yrs age with sport experience of 11-16 years participated. With cluster analysis 10 gymnasts with morphological indicators, meeting modern standards of group exercises were selected. *Results:* we found 5 generalized factors, which characterize structure of selection to teams and determines 72% of dispersion. Influence of kinds and connected with them criteria of compatibility on efficiency of gymnasts' competition functioning were also determined. The authors substantiated methodological approach to selection of sportswomen to calisthenics teams for group exercises, considering compatibility factor. *Conclusions:* in selection to calisthenics teams for group exercises it is purposeful to realize complex registration of compatibility kinds, considering gymnasts' similar features by recommended indicators.

Key words: group exercises, calisthenics, selection, compatibility criteria, methodology.

Introduction

Improvement of selection is constantly paid attention to by specialists [1; 4; 13; 20]. Though, scientific researches devoted to training of group exercises, were, mainly, oriented on improvement of some its kinds and did not elucidated selection sufficiently [3; 6; 9; 17].

Sportswomen's compatibility is principal condition of effective selection and training to group exercises in teams [2; 7; 10], as far as main structural element of technique in them are motor interactions. Their purpose is synchronous or accorded asynchronous mode of functioning, fulfillment of body contact elements, exchange of objects. Besides, it can be mutual with partner manipulations with one or several objects without exchanging of them. That is why selection and orientation of gymnasts to teams for participation in group exercises' competitions are rather important as factor of achievement of good sport results in this kind of calisthenics [11; 14].

At modern stage, in some works, authors describe criteria and methods of sportswomen's selection to teams for group exercises [5; 18]. But in this works compatibility is not regarded as main factor of complex approach to assessment of gymnasts' technical and physical condition, their morphological-functional indicators, ability to work in groups, to agree own actions with partners [8, 19]. This situation conditioned demand in our research.

Purpose, tasks of the work, material and methods

The purpose of the research is to prove methodological approach to selection of sportswomen to calisthenics teams for group performances, considering compatibility factor.

To achieve our purpose we used the following methods: analysis of scientific-methodic literature, electronic analysis of muscles' kinesthetic sensitivity with Back-check system, psycho-diagnostics methods, vector-cardiography, anthropometry, pedagogic testing, pedagogic observation, pedagogic experiment, methods of mathematical statistic processing of data.

Solution of our experimental tasks was realized on the base of National university of physical education and sports of Ukraine (1st- 4th year girl students). 50 gymnasts participated in our researches. Among them they were: 4 international masters of sports of Ukraine, 28 – masters of sports of Ukraine and 8 – candidate master of sports of Ukraine in calisthenics.

Results of the research

Formation of promising team for competitions in group exercises stipulated usage of wide range of selection criteria, which embraced motor, psychological, morphological, psycho-physiological and functional compatibility of sportswomen. By results of different compatibility kinds' analysis the tested gymnast were divided in groups. After determination of the most acceptable compatibility indicators, corresponding to specificity of group exercises, we completed main team for participation in competitions.

Motor compatibility envisaged selection of gymnasts, who had the highest indicators of special physical and technical fitness in manipulating of objects, as a pre-condition of formation of team's high level skillfulness. Integral indicator of these kinds of fitness in selected team ($n = 13$) was 8.4; 0.9 points ($V = 11\%$) and corresponded to level "above middle" as per existing qualification standards.

It was determined that for training of group exercises, mainly, sportswomen with similar morphological characteristics are selected, That is why as leading criteria we used the most visually expressed and the least variable indicators (body length, weight-height index, length of lower limbs and somatic type) (see fig.1). With the help of cluster analysis we found 10 gymnasts with morphological characteristics, which correspond to modern requirements to group exercises: body length (173; 3.01 cm); body mass and length index (19.3; 0.7 kg/m²); Pirket's index (98; 4.01 %); somatic type – endomorphic component (2.27; 1.4 conv.un.) mesomorphic component (2.88; 0.3 conv. un.), ectomorphic component (4.3; 0.5 conv. un.).

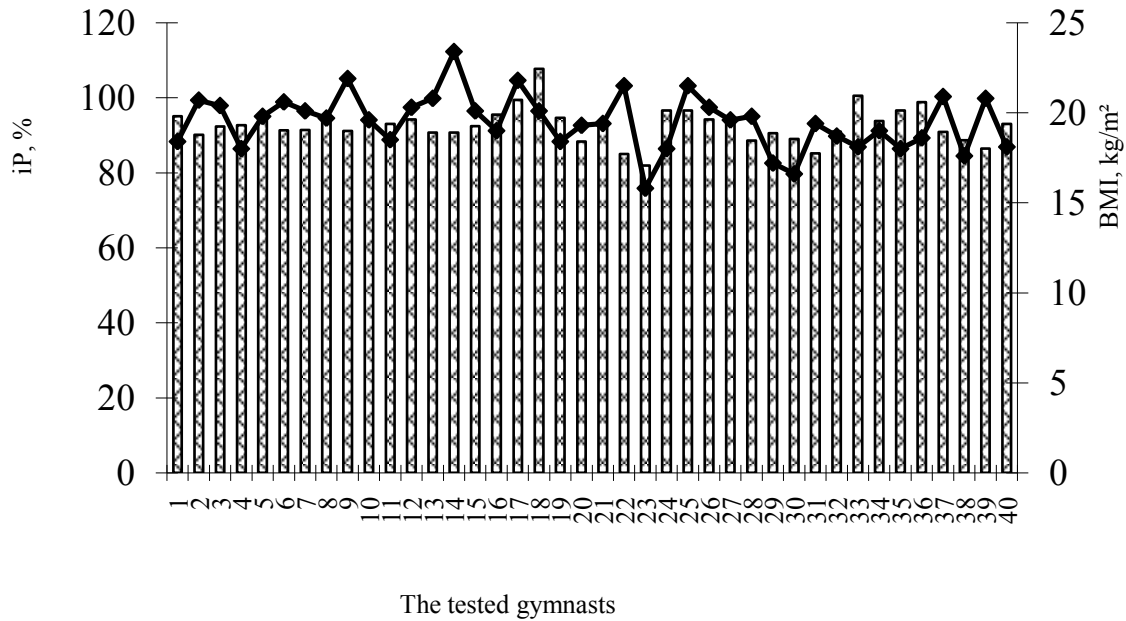


Fig. 1. Indicators of Pirket's index and BMI of calisthenics gymnasts (n = 40):

▨ – iP – Pirket's index, %;
—◆— BMI – body mass, kg/m²

Psycho-physiological compatibility is similarity of sportswomen by their ability to control accuracy of muscular force of upper and lower limbs as precondition of highly accurate motor functioning in different exchanges of objects and in mutual with partner manipulations of objects without exchanges of them. According to specificity of group exercises 12 sportswomen were selected to team, who had the least indicator of mistakes (0 - 5 %) from accurate fulfillment of motor task.

One of indicators of functional compatibility is reserve potentials of heart (assessment of hyper function and hypertrophy of myocardium of sportswomen). Analysis of sportswomen's functional compatibility on the base of registration of heart muscle's bio-electrical potentials showed that by functional criterion the most suitable for work in group exercises was first group of calisthenics gymnasts. This group is inclined to exercises of anaerobic-aerobic loads. The third group was composed of sportswomen with tensed mode of functioning with not saving character of heart work.

Assessment of psychological compatibility permitted to determine 13 sportswomen with the best for fulfillment of group exercises psychological characteristics, such as extraversion, emotional stability, adaptive behavior in any situation with weakly expressed wish to dominate, friendliness, ability to find compromise and to cooperate in conflict situation, ability to perceive group standards and values.

The received results made the basis for determination of leading criteria of selection to teams, considering compatibility kinds. 77 indicators were processed with factor analysis. As a result we found five general factors, which characterize structure of selection to teams with 72% of dispersion.

The first factor (22.3 % of sample's total dispersion) characterized motor compatibility, which is the most significant in selection to teams for calisthenics' group exercises. The second factor (21.2 % of dispersion) combined indicators, characterizing gymnasts' morphological parameters. The third factor includes indicators, characterizing psycho-physiological features of sportswomen. Its significance in total dispersion was 11.3 %. The fourth factor contained indicators of individual psychological characteristics of sportswomen. Its volume was 9.1 % in total dispersion. The fifth factor (8.2 % of total dispersion) included indicators of heart muscle's bio-electrical potentials, which characterized gymnasts' bent to fulfillment of different loads

Thus, with selection to teams for group exercises complex consideration of compatibility kinds with assessment of gymnasts' similarity by level of sportsmanship and morphological indicators as well as psycho-physiological, individual-psychological and functional characteristics is purposeful. In compliance with this algorithm of teams' completing through comparing of tests results of different compatibility kinds we recommended main staff of university's combined team for participation in calisthenics competitions in group performances.

On the base of testing of compatibility kinds and analysis of motor, functional, psychological, psycho-physiological and morphological criteria we formulated methodological approach to selection of sportswomen to calisthenics teams for group exercises. The basis of such approach was methods of analysis, synthesis and induction.

Method of analysis permitted (as per specificity of group exercises) to find and characterize kinds of gymnasts' compatibility and determine contribution of different criteria of selection. On the base of synthesis method separate selection criteria were combined in groups (as per kinds of compatibility). Induction method permitted to understand and generalize significance of compatibility kinds and adjoining to them criteria as leading factor in selection of gymnasts to teams for group exercises.

Methodology of selection to teams for group exercises on the base of complex consideration of compatibility kinds envisaged application of selection methods in the following hierarchic sequence:

1. Pedagogic methods of assessment of special physical and technical fitness; then – morphological (body length, mass-height index, length of limbs, somatic type);
2. Psycho-physiological methods (assessment of kinesthetic sensitivity);
3. Psychological methods (psychological features of personality, relations in team);
4. Functional methods (assessment of myocardium hypertrophy).

Such approach facilitated formation of complex and systemic understanding of sportswomen's suitability (by compatibility factor) for their training as members of team for group calisthenics exercises.

To substantiate effectiveness of methodological approach to selection of sportswomen to calisthenics teams for group exercises, considering compatibility factor, we conducted comparative pedagogic experiment, in which university's girl students participated. Experimental group ($n = 5$) included gymnasts with similar indicators by determined compatibility criteria. Control group 3 ($n = 5$) was composed of gymnasts, selected on the base of traditional approach, with different indicators of motor, morphological and functional indicators ($p < 0.05$).

After three months' training result of competition functioning of experimental group was by 7 % better than in control group ($p < 0.05$). It permitted for experimental group to take second place in championship of Kiyv and hope for participation in championship of Ukraine. After one month combined team (control group) could take only 17th place in championship of Ukraine. Thus, application of methodological approach on the base of compatibility factor's consideration, conditioned increase of efficiency of sportswomen's competition functioning in group exercises. Basing on the above mentioned we can regard gymnasts' compatibility as key factor of increase of calisthenics group exercises teams' efficiency.

All these were proved by results of analysis of compatibility of high qualification Ukrainian combined team members, who performed in group exercises. This team included 6 international masters of sports. All gymnasts are prize winners of 25th international university's competition (Belgrade, 2009). We determined that these gymnasts were characterized by similar morphological features and psycho-physiological indicators. All they had suitable for group work psychological characteristics, high special physical and functional fitness.

When determining interconnection of different compatibility criteria with results of competition functioning of highly qualified calisthenics gymnasts we found their middle and high correlation dependence ($r = 0.5 - 0.92$; $p < 0.05$). Thus, application of methodological approach to selection of sportswomen for participation in group performances at competitions, considering compatibility factor, is effective. Methodology of consideration of different compatibility kinds of gymnasts is in its basis. Sportswomen's compatibility is principle factor in completing of calisthenics teams for group performances.

Discussion

In conducted researches we determined problems and factors, which influence on effectiveness of sportswomen's selection to calisthenics teams for group exercises. We proved that existing system of sportswomen's selection to teams does not consider complex approach and is insufficiently agreed with specificities of group exercises' training at different stages [5, 6, 9, 12]. We proved that compatibility is the basis of effective calisthenics gymnasts' interaction and key factor in formation of promising teams for participation in competition on group performances [1, 10]. Besides, it regulates all process of training to mutual motor actions [2, 15]. We supplemented and expanded results of researches [1, 5, 8, 12, 14] devoted to improvement of sportswomen's selection to calisthenics teams for group exercises. For the first time we substantiated methodological approach to selection of sportswomen to calisthenics teams for group exercises on the base of complex consideration of gymnasts' compatibility criteria in determined hierarchy of significance and by kinds of compatibility.

Conclusions

1. Methodological approach to selection to calisthenics teams for group exercises conditioned working out of assessment of sportswomen's suitability in compliance with determined criteria by the following kinds of compatibility:

- Motor compatibility (mobility of ball joints, $r = 0.9$), balance ($r = 0.91$), power indicators of different muscular groups ($r = 0.72 - 0.87$), technique of manipulation with objects ($r = 0.7$);
- Morphological compatibility (relative content of fat mass, $r = 0.94$), relative content of muscular content, ($r = 0.7$), volume of different parts of body, ($r = 0.7 - 0.8$), somatic type, ($r = 0.87$);
- Psycho-physiological compatibility (kinesthetic sensitivity), ($r = 0.97$);
- Psychological compatibility (personality's features), ($r = 0.86$);
- Functional compatibility (indicators of heart muscle's bio-electric potentials), ($r = 0.75$).

2. Highly qualified sportswomen in group exercises' teams were characterized by similarity by criteria of motor ($V = 4 - 8\%$), morphological ($V = 0.6 - 13\%$) and psycho-physiological compatibility ($V = 7.3 - 11.7\%$). These

criteria correlate with result of the sportswomen's participation in competitions ($p < 0.05$):

- Criteria of motor compatibility – P3 9, 10, 18, 19 ($r = 0.72 - 0.87$);
- Morphological criteria – ectomorphic component of somatic type ($r = 0.92$), bode length and mass index ($r = -0.7$), body length ($r = 0.48$), relative content of muscular tissue ($r = 0.49$);
- Criteria of psycho-physiological compatibility – kinesthetic sensitivity (upper limb $r = -0.61$; lower limb $r = -0.81$);
- Criteria of psychological compatibility – level of neurotism ($r = -0.66$), extraversion ($r = 0.87$);
- Criteria of functional compatibility loop atrium and ventricle area (accordingly $r = -0.92$; $r = 0.5$).

3. Practical realization of complex application of compatibility criteria in selection of gymnasts to teams for competitions in group performances qualitatively increased effectiveness of competition functioning of main group sportswomen (team 1) by 7 % ($p < 0.05$), comparing with control group. With determining of interconnection of different compatibility criteria with results of competition functioning we found middle and high correlation dependences ($r = 0.5 - 0.92$).

The prospects of further researches imply working out of methodological approach to criteria of selection in system of many years' calisthenics group exercises teams' training, considering sportswomen's compatibility factor.

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Conflict interests

The authors declare they have no conflict interests.

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