BIOMECHANICAL STATUS OF THE BASIC ELEMENTS OF TECHNIQUE IN ATHLETICS, GYMNASTICS AND JUDO IN GENERAL

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Abstract:
On sample of 12 dynamic stereotypes (elements), more precisely 4 basic techniques from each sport discipline separately (athletics, gymnastic and judo) and some of them have already been implement in curriculum for physical education was conducted this research with main goal to determine biomechanical structure of 12 dynamic stereotypes in general. For this purpose the sample of elements of individual sports is analyzed by the method of qualitative biomechanical analyze. The data obtain from biomechanical analysis of elements are treated with more mathematic operations determine with algorithm "Alprobi". As a general conclusion can be stated that such placement or grouping of elements in the learning process could not expect more transfer in the learning process.

Key Words: *individual sport, basic technique, biomechanic characteristics*

Introduction

The principal means of achieving the goal of physical education and sports are physical exercise or sports techniques which can be dynamics or statics, or they are also named as a motor stereotypes. These sports elements and those disciplines that due to limited working conditions cannot be taught or used in teaching physical education does not mean that cannot be replaced by other means (sports elements or disciplines) and yet goal to be achieved . If objectively defined biomechanical structure of elements , it is possible to determine their intercorrelation , and based on it to perform clustering of sports movements that are provided in the curriculum. It allows relatively precise selection of elements of group movements with related biomechanical structure , which is an important indicator of the rationalization of the curriculum in physical education and in those areas where there are limited conditions for work, but also the implementation of other sports disciplines as sports exist in our country but are not learning in physical education classes .

The survey are covered some of the basic elements of the sport disciplines and some of them are studied on the lessons in physical education. Biomechanic features of any dynamic or static motorstereotype (movement, technique, element or exercise) are determined by qualitative biomechanical analysis. It allows the selection and construction of the variables to be done on that way as any movement can be defined in all biomechanic space.

Material & methods

In a research are taken 12 dynamic stereotypes (elements), four of the basic techniques of each sport discipline separately (athletics, gymnastics and judo). From athletics are taken: jump technique, jump technique stredel, discus throw, shot put technique rational. Taken techniques from gymnastics are: rotation forward, rotation on hands in side, position on hands, rotation backward. And from judo are taken: fall forward - Mae ukemi, throwing techniques - ipon seio nage, throwing techniques - morote seoi nage, throwing techniques - hara goshi.

The sample of the elements of individual sports is analyzed by the method of qualitative biomechanical analysis, and the results are given in binary matrix with

The data obtained from biomechanical analysis of elements are treated with more mathematic operations defined by Algorithm "ALPROBI". First of all is formed binary matrix with basic biomechanical characteristics of movements. From this matrix we get symmetric matrix for standardized measures of biomechanical similarity and are determine all other parameters of biomechanical structure of the model.

Results

Results of the qualitative biomechanical analyze are given in binary matrix with symbols 1 and 0.

Table 1. Matrix of intercorrelation

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00000											
2	0.17817	1.00000										
3	0.25820	0.82808	1.00000									
4	0.21517	0.72457	0.86667	1.00000								
5	0.04233	0.00000	0.03279	0.06558	1.00000							
6	0.04915	0.00000	0.03807	0.07614	0.59920	1.00000						
7	0.04536	0.03637	0.03514	0.03514	0.13826	0.20064	1.00000					
8	0.04915	0.03941	0.03807	0.03807	0.26215	0.30435	0.60193	1.00000				
9	0.04377	0.03509	0.03390	0.03390	0.00000	0.00000	0.00000	0.00000	1.00000			
10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.06700	0.07260	0.29093	1.00000		
11	0.04714	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.33425	0.27852	1.00000	
12	0.04454	0.03571	0.03450	0.03450	0.00000	0.00000	0.00000	0.00000	**0.94751**	0.29608	0.37796	1.00000

Table 2. Coefficient of biomechanical correlation between groups of elements in each group as a whole

CABS group 1	0.512
CABS group 2	0.351
CABS group 3	0.421
CABS in whole	0.13343

Coefficient of biomechanical strength of connections among elements within their group

1: 0.08845	7: 0.10544
2: 0.17067	8: 0.12779
3: 0.19686	9: 0.15630
4: 0.18998	10: 0.09138
5: 0.10366	11: 0.09435
6: 0.11523	12: 0.16098

Based on the results shown in Table 1. it can be concluded that the coefficients are in the limits of very low or the value (0) to extremely high in value (0.948).

Coefficients of biomechanical similarity in groups are ranging from low (0.351) to medium (0.512).

Coefficients of force biomechanical similarity are ranging in the limit of low values from 0.088 to 0.196.

Discussion

The analysis results where standardized measures of biomechanical similarity are shown (table 1.) can be concluded that:

The highest ratio of biomechanical similarity is present between elements shot put technique rational and rotation backward with coefficient of 0.948.

The lowest coefficients or there is not similarity between elements where the coefficient is 0.

The ratio of full biomechanical similarity is very low CABS = 0.133, which indicates that they have expressed different biomechanical structure in general.

The highest ratio of strength of biomechanical connection element is present in CABI = 0.197 "Morote seoi nage" indicating that this element is the most similar to all defined in terms of biomechanics, and therefore it should be given the most time in the learning process in this group of elements.

The lowest coefficient or lowest ratio strength of biomechanical connection is present in the element CABI = 0.088 "Mae ukemi" which indicating that this element is at least similar in terms of defined biomechanics.

Based on the results shown in Table 1 it can be concluded that elements are most similar and least similar within their group:

Most similar elements within the first group - Athletics regarding of biomechanical structure are discus throw and shot put technique rational with coefficient 0.866667, and at least similar are long jump technique and jump technique stredel with coefficient 0.17817.

The highest coefficient of biomechanical strength connection in these group is 0.512 which is middle.

Most similar elements within the second group - Gymnastics regarding of biomechanical structure are position on hands and rotation backward with coefficient 0.60193, and at least similar are rotation forward with position on hands with coefficient 0.13826

The highest coefficient of biomechanical strength connection in these group is 0.351 which is low.

Most similar elements within the third group - Judo regarding of biomechanical structure are fall forward - Mae ukemi and throwing technique - harai goshi with coefficient of and at least similar are throwing technique - ippon soi nage and throwing technique - harai goshi whit coefficient 0.27852.

The highest coefficient of biomechanical strength connection in these group is 0.421.

Regarding of biomechanical similarity among elements from different groups:

The highest similarity between the first and second group with a ratio of 0.07614 is present between elements shot put technique rational and premet vo strana.

The highest similarity between the first and the third group with a ratio of 0.4714 is present between elements high - jump technique and throwing technique - morote seoi nage.

The highest similarity between the second and the third group with a ratio of 0.07260 is present between elements rotation backward and throwing techniques - ippon seoi nage.

Based on the analysis results, sports disciplines more precisly elements of choosen sports (motor stereotypes) selected in this study can be grouped into several sections with different bimehanichka structure .

Athletics : Long jump - Acyclic movements with complex anatomical structure , high jump , discus throw and shot put - acyclic motion with asymmetric anatomical structure - generalized .

Gymnastics : rotation forward and backward - Acyclic symmetric movements with anatomical structure - generalized , position on hands - Acyclic movements with asymmetric anatomical structure - generalized , premet vo strana - Static stereotypes (static exercises)

Judo : Drop forward - Mae ukemi , throwing techniques : seoi nage IPON , seoi nage and Morrow hara goshi - Acyclic movements with complex anatomical structure .

Conclusions

Considering neurophysiologic-biomechanical laws of sporting element, in some extent may contribute to the formation of new curricula for students of appropriate age to be more rational. The rationality is that from those movements which have related structure can be selected only some representative or representatives that the process of their learning or training creates new motor mechanisms in the central nervous system, called engrami who are responsible for regulation of motor manifestations of movements with similar biomechanical structure. Based on this logic, when you have in mind this neurophysiologic-biomechanical criteria for planning and programming, the goal of physical education can be accomplished with a different choice of teaching content or element. This is especially important for lessons that are conducted in different materials - spatial conditions.

Based on the results pertaining biomechanical homogeneity of the analyzed elements, their choice could not give greater transfer in the learning process.

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