CHANGES IN PHYSICAL CONDITIONING STATUS OF MALE STUDENTS OF THE FIRST YEAR OF FACULTY OF KINESIOLOGY INFLUENCED BY EDUCATIONAL PROCESS

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Abstract

The goal of this study was to determine changes in some parameters of physical preparedness of population of students, in certain variables estimating agility and speed, influenced by previously programmed and defined training i.e. educational process in summer semester of academic year 2002/2003. Sample of entities was comprised of 182 male students of first year of Faculty of Kinesiology aged in the span of 18-26 years. Two testing procedures were conducted by the battery of six tests. Programmed training process was implemented in the period between two testing procedures, from 10.-14. 03. to 09.-13. 09. 2003. This period of 91 days contain 63 days of training and 28 days of rest. 113 hours of practical classes were held: Handball (39), Basic kinesiological transformations (35) and Athletics (39). Intensity of workload was approximately in the range between 50% and 90% of maximum. Conclusions taken from results reveal the highest quality level of training cycle plan, program, conduction and control.

Key words*: agility, transformation processes, team handball*

Introduction

Diagnostics of training preparedness is an important precondition for successful planning, programming, conduction and control of preparation process in sport with complement development of functional and motor abilities and best sport results as a main function (Milanović et al., 1996).

General information, regarding the goal of this paper, were offered in previous research in diagnostics of physical preparedness (Milanović et al. 1996, 1997; Milanović et al, 2003) and analysis of the impact of different kinesiological programs (Vuleta, 2000; Vuleta et al., 2001; Srhoj&Rogulj, 2001; Gruić, 2002, Vuleta et al., 2002, etc.). Lackness of individual approach is a cause for imprecise definition of goal-orientation of conditioning program, whereby accidental effects occur, not those imputable to training programme or experts competitions.

Agility constitute great portion of successfulness in team handball. It is generally defined as ability of rapid change of direction/course. Metikoš et al, 2003., defined it as „ability of fast/quick replacement of the body in space conditioned by abrupt deceleration and direction change“. This research was based on program preliminary defined by curriculum of Faculty of Kinesiology, especially regarding practical lessons, courses and exercises of subjects Team Handball, Athletics, Basic Kinesiological Transformations. Overview of, and insight in previous research offered conclusions with partial explanation but good basis for definition of possible projections of progress determined by actual conditions.

Problem and aim

The goal of this research is to define changes of conditional preparedness indicators, mainly agility and speed, caused by programmed training process applied in the second semester framework of 2002/2003 academic year for first year students at Faculty of Kinesiology.

Methods

Sample of entities

Sample of entities is represented by 182 first year students at Faculty of Kinesiology, 18-26 years old males (mod=19). Only healthy students, with no contraindicative impact of program, participated in the experiment.

Sample of variables

Sample of variables is comprised of 6 specific motor ability tests, estimating level of agility and speed, but indirectly other elements of agility as well (like coordination and explosive power).

Table 1. Sample of variables

TEST	NAME	INTENTIONAL MEASUREMENT SUBJECT
AGIL	Running between goalposts and 4-meter line	Specific agility
SRB20V	Running and dribbling the ball on 20 meter distance	Specific speed
K2T1	Movements inside two triangles – one cycle	Specific agility
K2T3	Movements inside two triangles – three cycles	Specific agility
SRBTSL	Running and dribbling the ball in slalom	Specific agility and speed
SRBVSL	Running in slalom	Specific agility and speed

Experimental program of a training process
Results of initial testing are a precondition for modelling and remodelling the program according to objectives and real necessities, which imply proper choice of contents, loads and methods for training operators which are set into a function of optimal transformation, regarding both, informational and conditional effects simultaneously. Plan with elements of program and summarized parameters are presented in table 2.

Table 2. Training parameters for period between initial and final measurements

PERIOD between two measurements	total
CONDITIONAL/INFORMATIONAL TRAINING RATIO	40 : 60
DAYS OF A MESOCYCLE	91
DAYS OF A TRAINING	63
NUMBER OF A TRAINING	78
TRAINING HOURS	113
DAYS WITHOUT TRAINING	28
NUMBER OF CONDITIONAL+INFORMATIONAL TRAINING HOURS	45 + 68
AVERAGE EXTENSITY OF WORKLOAD IN TRAINING DAY	1,8
AVERAGE INTENSITY OF WORKLOAD IN TRAINING DAY	70

Duration of period: 10.-14.03. to 09.-13.09.

Between initial and final testing i.e. period of 91 days, 63 days were training days. Students participated in 113 hours of practical education in subjects: Team Handball (39), Basic Kinesiological Transformations (35) and Athletics (39), with 28 days of rest. Extensity of load is an equation defined by proportion of total working/training hours and days of a cycle. Intensity of a training load had approximately 40% span in range between 50% and 90% of maximum.

Data analyses methods
Raw data were collected by testing procedures in two time points, processed by statistical package Statistica/W 5.0., and presented in tables 3, 4, 5 and 6. Changes in conditional preparedness indicators, which occurred under the impact of goal-oriented, planned, programmed and controlled education/training process, were analyzed by multivariate analysis of variance (MANOVA). Partial effects were examined by Univariate Analysis of ANOVA).

Results

Table 3. Descriptive statistics – initial measurement

	N	AS	MIN	MAX	SD
AGIL	182	14,31	12,24	16,40	0,77
SRBV20	182	3,59	3,13	4,51	0,24
K2T1	182	5,94	4,55	7,99	0,50
K2T3	182	16,96	13,28	22,05	1,36
SRBTSL	182	15,19	13,49	17,62	0,67
SRBVSL	182	17,09	14,37	18,91	0,84

Table 4. Descriptive statistics – final measurement

	N	AS	MIN	MAX	SD
AGIL	182	13,9	11,87	16,99	0,75
SRBV20	182	3,39	2,97	3,90	0,19
K2T1	182	5,48	4,41	6,80	0,42
K2T3	182	16,3	13,56	20,01	1,26
SRBTSL	182	14,9	13,37	16,66	0,61
SRBVSL	182	16,5	15,07	18,87	0,77

Table 5. Multivariate indicators of changes

SUMMARY EFFECTS				
Wilks' L	Rao's R	df 1	df 2	p-level
0,69	25,57	6	357	0,00

Table 6. Univariate indicators of changes

PARTIAL EFFECTS				
	Mean	Mean	F=1,36	p-
AGIL	11,64	0,58	20,14	0,00
SRBV20	3,59	0,05	77,94	0,00
K2T1	18,60	0,22	86,56	0,00
K2T3	38,21	1,72	22,22	0,00
SRBTSL	3,52	0,41	8,56	0,00
SRBVSL	24,78	0,65	37,99	0,00

Discussion and conclusion

Complete, reliable and interpretable information about changes caused by training process, present basis for all steps of planning, programming and operation within training process. Grouped results i.e. some descriptive parameters in initial and, after application of thirteen-week-long education/training program, final testing, are presented in tables 3 and 4.

Numerical differences in results regarding variables of observed motor abilities are registered. Differences between means, minimums and maximums are respectively high, so statistical significance of those differences may be assumed, but not affirmed as significant, and yet to be analysed. Registration of certain positive shift of observed abilities between two time points, was analysed by Multivariate Analysis of Variance (MANOVA). Multivariate indicators revealed statistically significant differences i.e. changes in observed motor abilities under the impact of conducted training procedures between two measurement points. Improvement in motor abilities i.e. indicators of conditional preparedness is statistically significant with 99% assurance (p= 0,01; table 5). 91-day interval sufficed, and ensured that the effects of application of operators defined by program would accomplish minimum criteria of demonstration and formation of required techniques and motor stereotypes, in one hand, and realize positive shift/transfer in manifestation of conditional parameters of students' abilities. Statistical significance of differences between first and second centroid does not offer disclosure of all information about partial effects, thereby Univariate Analysis of Variance was conducted to determine differences in each separate variable in order to examine eventual contributions of each variable analysed to general differences (table 6). In research of influences of different programs on anthropological status, likewise this as well, factors with significant impact on the finale outcome were initial status, congeniality of motor abilities level (greater coefficient of congeniality is greater delimitation of influence of program in short-term perspective is, and vice versa if compared to lower coefficient of congeniality), contents, loads, modalities and frequency of applied operators (greater frequency is, greater transformation is, but not in terms of unquestioned regularity, especially regarding overtraining), time period and periodization, technical, material and human/staff resources etc. Results of the treatment defined by curriculum and operative program are in concordance with previously set objectives and tasks, and with previously expected positive effects. Workload dosage sufficed and usage of environment in predefined time-span was adequate. Changes may be explained directly by the impact of concrete operators, but the secondary goal of this paper was to define transformations indirectly, trough relation between conditional and informational input. Both conditional and informational transformations were set in the frame of agility constituting motor abilities, which are explosive strength/power, speed, coordination. Thereby, were effects achieved on the count of all of them, or should there be separate interpretation, especially if treated as specific motor abilities? Answer lies in definition of determinants of simple neuromuscular contraction mechanisms (biomechanical, neural, and muscular). Motor stereotypes in terms of kinetical chains may alter, intermuscular and intramuscular coordination may be improved to a certain extent, and mode of selective hypertrophy in motor units is defined by inervation mode of different kinesiological operators. Programmed thirteen-week training/education process was long enough to improve the agility mostly on the count of biomechanical (angle, distance, length, etc.), to a smaller extent on the count of neural (number and speed of impulse, synchronization), and to the smallest extent on the count of muscular determinants (architecture of a muscle, type of muscle fibre, ratio, etc.). Informational component of the total input was dominantly responsible for positive effects presented in this paper. That means that partial contributions, if set in line from greater to smaller, of constitutive abilities were – coordination (general, intermuscular, intramuscular) in the first hand and, explosive power (of a jumping type) and speed (frequency speed) in the second. Other aspects, like psychological, sociological, etc., should be aligned with general concept of motor learning. Well defined, qualitatively and quantitatively, internal structure of applied kinesiological operators ensured positive effects of education/training program, especially regarding conditional/informational ratio in total input. Future acknowledgements of structure of motor abilities, in this case agility, are a precondition and a basis for future projections of changes and possible transformational effects. Research continuity with deepening end widening approach is a necessity. All basic and specific motor abilities should be set in cybernetic relation to each other and to other abilities and dimensions as well, especially in research on complex, polistructural kinesiological activities.

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PROMJENE U NEKIM POKAZATELJIMA KONDICIJSKE PRIPREMLJENOSTI STUDENATA PRVE GODINE KINEZIOLOŠKOG FAKULTETA POD UTJECAJEM NASTAVNOG PROCESA

Sažetak

Istraživanje je provedeno s ciljem utvrđivanja promjena u nekim pokazateljima kondicijske pripremljenosti, konkretno u varijablama za procjenu agilnosti i brzine, a pod utjecajem unaprijed programiranog i definiranog trenažnog odnosno nastavnog procesa u ljetnom semestru ak. god. 2002/2003. Na uzorku ispitanika koji čini 182 studenta prve godine studija na Kineziološkom fakultetu u dobi od 18 – 26 godina muškog spola., provedena su dva mjerenja. Stanje pripremljenosti je kontrolirano u dvije vremenske točke i to baterijom od šest testova. Programirani trenažni ciklus je proveden u razdoblju između dva testiranja, od 10.-14. 03. do 09.-13. 09. 2003. godine. Između inicijalnog i finalnog testiranja, u periodu koji je trajao 91 dan, bila su 63 trenažna dana. Sa studentima je održano 113 sati praktične nastave iz kolegija: Rukomet (39), Osnovne kineziološke transformacije (35) i Atletika (39), a odmora je bilo ukupno 28 dana. Intenzitet opterećenja treninga se aproksimativno kretao u rasponu između 50% i 90% maksimalnog opterećenja. Informacijski i kondicijski input koji je u nastavnom/trenažnom ciklusu bio planiran, programiran te proveden, a na kraju i kontroliran proizveo je pozitivne I statistički značajne (Wilk's lambda = 0,69, p=0,00) transformacijske učinke u prostoru agilnosti.

Ključne riječi*: agilnost, transformacijski procesi, rukomet*

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