ROYAL JELLY AS A SUPPLEMENT FOR YOUNG FOOTBALL PLAYERS

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Abstract
In direct application of scientific discoveries to good quality training process, royal jelly as a supplement is applied as a criterion of positive change in the phase of adaptation and exhaustion of young football players' bodies. Research carried out with 25 FC "Red Star" Belgrade football players, 12 years old, separated in 2 groups. Experimental group (15) took the supplement daily for two months. The control group (10) did not use the supplement. All the examines during the two months had a regular regime of training (4 times per week) and they competed in the youngest Belgrade league. It were observed 13 morphological characteristics in initial and final measuring. On the basis of the research results it could be concluded that football players from experimental group who used royal jelly had statistically significant increase of body height and muscle component, and decrease of fat component in final measurement comparing to the initial. Also, the results show statistically significant increase in circumference above knee and circumference of lower leg in experimental group on the end of the experimental treatment. The examinees from experimental group had higher average values in body height, body mass, muscle and bone component, and lower average value in fat component.

Key words*: royal jelly, nutrition supplement, muscle, fat and bone component.*

Introduction

Physical activity is an integral part of a person's life and it is a constant battle of man and his environment which starts at his birth. The intensity of the battle grows as man matures and for every age there are specific characteristics. At a certain level of development and training a stressful reaction appears which is constant and has its development phases: alarm phase, adaptation phase and phase of exhaustion. The task of people employed in sports is to teach and prepare the body for creating stronger defense mechanisms for new stress agents. The question is raised how to involve a young body into a sports activity and not to disturb his biological development and, simultaneously, to achieve top results which sport requires. The body not involved in sports satisfies the requirements of normal mental and physical development by daily food intake. However, if the candidate performs increased physical activity, regular and daily food intake cannot be enough for both requirements - food supplements are needed, and those are vitamins, minerals, essential amino acids and an array of other biologically active substances whose task is to satisfy previously mentioned requirements.

Nowadays market offers thousands of remedies which are supposed to help young athletes. Their content and quality vary, from common water to hormonal remedies which can sometimes do greater damage to the body than good. One of those remedies is royal jelly which has positive effect on the body of an athlete and can be used for medical purposes and in medicine it is used from pediatrics to geriatrics. The structure of royal jelly can be used in many body states which we call non-physiological: improvement of heart function, strengthening of immune system, improvement of mental state and mood, strengthening and increase of body resistance, regulation of adrenal gland function under stress, depression relief, fatigue, neurosis, insomnia and the likes, stimulation of functioning of gland with internal secretion, regulation of functioning of all organs and tissues, improvement of convalescents recovery etc. Numerous scientific analysis (Ardry, 1956; Howe et al., 1985; Otani et al., 1985; Takenaka, 1984 and 1987; Schmitzova et al. 1998) show that royal jelly contains all of these substances for which we lobby and which should be taken in any form; they resorb rapidly and are taken to basic units – cells by transport mechanism.

At that level bioactive actions take place. Some research (Johansson & Johansson 1958; Bonomi 1983; Prosperi & Ragazzini 1956; Destrem 1956) followed the effects of use of royal jelly on a sample of adults over a certain period. The following was determined: improvement of heart function and blood vessels, better excitation of nervous system, faster relief of fatigue, shortening of recovery time and other parameters which are significant for achieving results in football. Johansson's research shows that royal jelly has positive effect on intestinal flora and this antimicrobial activity can be explained by PH value activity. The effect of some components on endocrinal glands or their intake and entering the enzyme system which affects the metabolism was investigated by Bonomi in 1983 emphasizing the positive effect. Prosperi and Ragazzini (1956) argue that royal jelly affects the basic state, increases body mass, erythrocytes, hemoglobin (80-100 mg daily). According to Destrem in 1956 royal jelly achieves good effects when 20 mg is injected every day or every other day. Takohashi et al. (1983) point out the appearance of allergic contact dermatitis caused by royal jelly in patients which are sensitive to it. Ardry (1956) thinks that royal jelly influences the body by stimulating the gland with internal secretion, especially the adrenal gland. The subject of research is royal jelly as the supplement in the preparation period with young football players, seventh and eighth grade primary school students and their morphological characteristics.

The basic concern of this research is how efficient the application of royal jelly is as a supplement in the preparation period for morphological characteristics development at the end of experimental period in the process of training work with experimental group. The general aim is to determine the efficiency of application of royal jelly as a supplement for the development of morphological characteristic in the experimental group. A specific goal is to determine the difference at the end of the experiment in morphological characteristics between experimental and control group. Based on the subject, the matter and the aim of the experiment the following tasks were set: a) to determine morphological characteristics on initial and final measurements in experimental and control group; b) to determine the differences in morphological characteristics between initial and final measurement in experimental and control group; c) to determine the differences in morphological characteristics between experimental and control group at the end of experimental treatment.

Methods

Sample of examines

Research was done on a sample of 25 young football players from „Red Star“ football club in Belgrade, 12-year-olds separated into two groups. Experimental group consisted of 15 examines who were taking royal jelly supplement five times a week for two months. Control group consisted of 10 young football players who were not taking royal jelly. All examines were during two months of experiment exposed to regular training (4 times a week) and competed within the Belgrade league.

Variables sample

Research was planned so as to register values of 13 characteristics in observation of all examines at the beginning of research and after two months in order to assess whether there is change in values of observed characteristics within all of the research groups as well as whether there is difference in values of observed characteristics between experimental and control group. The following characteristics of observation were monitored: body height (BH), body mass (BM), muscle component (MC), bone component (BC), fat component (FC), diameter of elbow (DE), diameter of wrist (DW), diameter of knee (DK), diameter of ankle (DA), circumference above elbow (CAE), circumference of forearm (CFA), circumference above knee (CAK), circumference of lower leg (CBK). Anthropometric measurements of morphological characteristics are taken from Kurelić et al 1975.

Determining bone component

Mateigka calculates bone component according to formula:Skeleton mass in grams = body height * K_1 * D^2 ; Body height in mm; K_1 (constant) = 1.2; D = (diameter of elbow + diameter of knee + diameter of wrist + diameter of foot joint) / 4. Relative bone component is calculated according to formula: Relative bone mass = skeleton mass in grams * 100 / body mass.

Determining muscle component

Mateigka calculates muscle component according to the following formula:Muscle component = r^2 * body height * K; r = mean value of radii calculated from circumference of body segments, and it is calculated according to formula: r = ((CAE+CFA+CAK+CBK) / 25.12)–((SCAE+SCFA+SCAK+SCBK) / 8), where the abbreviations mean as follows: CAE – circumference above elbow, CFA – circumference of forearm, CAK – circumference above knee, CBK – circumference of lower leg, SCAE – skin crease above elbow, SCFA – skin

crease of forearm, SCAK – skin crease above knee, SCBK – skin crease of lower leg, K (constant) = 6,5. Relative muscle component is calculated according to formula: Relative muscle mass = muscle mass in grams *100 / body mass

Determining fat component

Mateigka calculates mass component according to formula: Mass component = d * TP * K_2; d = mean value of measured skin creases (above elbow, forearm, above knee, lower leg, back and stomach) divided by 12. TP = surface of body in cm^2, (nomogram for calculation of surface of body Barou and Rozmari 1975, 179, picture 8-6.); K_2 (constant) = 0.13. Relative fat component is calculated according to formula: Relative mass component = fat component in grams * 100 / body weight.

Method of data processing

Research of effects of royal jelly application as supplement in young football players preparatory period was carried out within 32 training sessions over a two-month period for the experimental group, which has used royal jelly as supplement five times a week.

The control group had 32 training sessions as well over a two-month period, simultaneously with the experimental group. The operational plan and program with both groups of examines were the same and they were drawn up in the football club. With both examine groups two measurements of morphological characteristics were performed at the beginning and at the end of the experiment. With the goal of getting statistical analysis of research results a database was formed using statistical program SPSS 11.5 for Windows.

Central and dispersive parameters of attained anthropometrical measurement results for experimental and control group were calculated. Differences in anthropometrical measurements of experimental and control groups were determined by Student's T-test for dependant and independent samples.

Results

Table 1. Descriptive statistical indicators of experimental group examines in 1st and 2nd measurement and differences between 1st and 2nd measurement

Variables		AVG	N	SD	SE	AVG-D	t	df	p
BH	BH I	152,46	15	6,29	1,62	-1,66	6,74	14	**0,000**
	BH II	154,13	15	6,79	1,75				
BM	BM I	42,95	15	6,45	1,66	-0,35	1,21	14	0,246
	BM II	43,30	15	6,51	1,68				
MC	MC I	41,22	15	3,18	0,82	-2,13	2,67	14	**0,018**
	MC II	43,35	15	2,16	0,55				
BC	BC I	19,74	15	1,56	0,40	0,27	1,03	14	0,322
	BC II	19,47	15	1,28	0,33				
FC	FC I	16,87	15	4,90	1,26	2,76	5,84	14	**0,000**
	FC II	14,10	15	3,71	0,95				
DE	DE I	6,35	15	0,63	0,16	-0,029	0,16	14	0,878
	DE II	6,38	15	0,56	0,14				
DW	DW I	4,91	15	0,42	0,11	-0,053	0,93	14	0,370
	DW II	4,97	15	0,34	0,88				
DK	DK I	9,37	15	0,57	0,15	0,087	0,50	14	0,625
	DK II	9,28	15	0,60	0,15				
DA	DA I	6,40	15	0,81	0,21	-0,353	1,87	14	0,083
	DA II	6,76	15	0,26	0,68				
CAE	CAE I	21,79	15	1,72	0,44	-0,61	1,03	14	0,132
	CAE II	22,40	15	1,39	0,35				
CFA	CFA I	20,51	15	1,12	0,28	-0,15	1,00	14	0,335
	CFA II	20,67	15	1,00	0,25				
CAK	CAK I	44,61	15	4,50	1,16	-2,59	2,38	14	**0,032**
	CAK II	47,20	15	3,86	0,99				
CBK	CBK I	31,45	15	2,04	0,52	-1,20	3,24	14	**0,006**
	CBK II	32,65	15	2,07	0,53				

AVG = average, N = number of entities, SD = st. deviation, SE = st. error,
AVG-D = difference average, t= t-test value, df degrees of freedom, p = probability

Table 2. Descriptive statistical indicators of control group examines in 1st and 2nd measurement and differences between 1st and 2nd measurement

Variables		AVG	N	SD	SE	AVG-D	t	df	p
BH	BH I	158,12	10	4,69	2,35	-0,50	2,45	9	0,092
	BH II	158,82	10	5,02	2,51				
BM	BM I	42,62	10	3,54	1,77	0,00	0,00	9	1,000
	BM II	42,62	10	3,42	1,71				
MC	MC I	43,52	10	3,09	1,54	1,01	0,90	9	0,437
	MC II	42,50	10	1,66	0,83				
BC	BC I	21,34	10	0,56	0,28	1,75	3,03	9	0,056
	BC II	19,59	10	1,19	0,60				
FC	FC I	12,19	10	4,46	2,23	-0,53	-0,70	9	0,535
	FC II	12,73	10	3,42	1,71				
DE	DE I	6,53	10	0,34	0,17	0,22	0,984	9	0,398
	DE II	6,30	10	0,33	0,16				
DW	DW I	4,85	10	0,10	0,05	0,02	0,52	9	0,638
	DW II	4,82	10	0,09	0,05				
DK	DK I	9,47	10	0,25	0,12	0,00	0,00	9	1,000
	DK II	9,47	10	0,46	0,22				
DA	DA I	6,87	10	0,36	0,17	-0,10	0,56	9	0,613
	DA II	6,97	10	0,21	0,10				
CAE	CAE I	20,52	10	1,25	0,62	-0,30	0,59	9	0,595
	CAE II	20,82	10	1,45	0,72				
CFA	CFA I	19,32	10	0,39	0,19	-0,43	1,35	9	0,118
	CFA II	19,75	10	0,59	0,29				
CAK	CAK I	43,02	10	1,98	0,99	-0,60	0,58	9	0,605
	CAK II	43,62	10	0,25	0,12				
CBK	CBK I	31,50	10	1,47	0,73	0,07	0,10	9	0,924
	CBK II	31,42	10	0,51	0,25				

AVG = average, N = number of entities, SD = st. deviation, SE = st. error,
AVG-D = difference average, t= t-test value, df degrees of freedom, p = probability

Table. 3. Testing significance of difference between experimental and control group

Variables	t-test for undependent samples			
	t	df	p	$\bar{X}$,
BH	-1,664	23	0,114	-5,66
BM	0,095	23	0,926	0,32
MC	-1,290	23	0,214	-2,30
BC	-1,973	23	0,065	-1,59
FC	1,723	23	0,103	4,68
DE	-0,518	23	0,611	-0,17
DW	0,295	23	0,771	0,06
DK	-0,364	23	0,721	-0,11
DA	-1,108	23	0,283	-0,47
CAE	1,361	23	0,191	1,26
CFA	2,054	23	0,056	1,19
CAK	0,674	23	0,509	1,58
CBK	-0,048	23	0,962	-0,05

Discussion and conclusion

In Table 1 it is noticeable that the average values of body height, body mass and muscle component in the experimental group have increased, the average value of fat component has decreased while the average value of bone component has remained almost the same as at the beginning.

The values of Student T-test show the existence of high statistically significant increase of body height (=1,66cm) and statistically significant decrease of fat component value (=2,76%) after the two-month consumption of the substance. Statistically significant increase of muscle component value was determined (=2,13%), whereas there is no statistical significance in value of body mass and bone component. Results also indicate that there are no bigger changes of values in circumference of elbow, arm wrist, knee and ankle in examines who have used royal jelly. In Table 2 it is evident that there are no bigger changes of values in body height, body mass, muscle and fat component at the final in comparison to initial measurement with control group. Also, there are no changes in diameter and circumference measures. Results of Student T-test indicate that there is no statistically significant difference of examined traits in the experimental group. Also, it can be seen that there has been a statistically significant increase of circumference above knee (=2,59cm) and circumference of lower leg (=1,20cm) in examines who have used the substance.

Table 3 shows the results of Student T-test for independent samples. By comparison of results at the end of research in the experimental and control group there are no statistically significant difference in measured variables.

However, the examines in the experimental group had, after the two-month substance consumption on average 1,58 cm greater circumference of lower leg than the examines of the control group. In modern football, in the conditions of high intensity game, longer intervals of endurance and shorter intervals of rest, high requirements of anthropological characteristics are set especially for motor and functional abilities and morphological characteristics. The development of listed anthropological characteristics has effectuated in the process of training work in line with individual abilities and football players' characteristics. A number of scientists (Jerković, 1986; Petrić, 1994; Hadžić, 2005; Joksimović, 2007.) point out that for anthropological characteristics development of football players proper methodical formation of training is crucial (planning, programming, control, methods for the development of abilities and other factors). There are almost no research studies which recommend substances to help young football players for the development of abilities and traits and proper biological development of body. In the last few years some researchers (Bonomi, 1983; Takahashi et al., 1983) point out that the royal jelly substance has positive effect on the body of a footballer and it ameliorates the growth and development of the body.

In the last few years in the development of football game there have been changes in the manner and the system of the game which caused the structure of the training process to be innovated by a new and more rational content of work. The modern game requires more dynamics and universal ability of the player in the phase of defense and offence (Joksimović, 2007). That kind of game requires a greater physical ability from the footballer which cannot be satisfied through regular and every day diet. Such cases require so called supplements and those are vitamins, essential amino acids and other biologically active substances, whose aim is to satisfy the requirements of diet in strenuous training process of young football players. With regard to length of experimental treatment (2 months), bigger differences in morphological characteristics couldn't happen.

On the basis of the research results it could be concluded that football players from experimental group who used royal jelly had statistically significant increase of body height and muscle component, and decrease of fat component in final measurement comparing to the initial. Also, the results show statistically significant increase in circumference above knee and circumference of lower leg in experimental group on the end of the experimental treatment. The examinees from experimental group had higher average values in body height, body mass, muscle component, and lower average value in fat component.

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MATIČNI MLIJEČ KAO SUPLEMENT KOD MLADIH NOGOMETAŠA

Sažetak

U neposrednoj aplikaciji naučnih saznanja u kvalitetnom trenažnom procesu matični mliječ kao suplement primjenjen je kao kriterijum pozitivne promjene u fazi adaptacije i iscrpljenosti organizma mladih fudbalera. Istraživanje sprovedeno sa 25 fudbalera FK "Crvena Zvezda" Beograd, starih 12 godina podjeljenih u dvije grupe. Eksperimentalna grupa(15) uzimala je preparat mliječa svakodnevno dva mjeseca. Kontrolna grupa(10) nije koristila preparat mliječa. Svi ispitanici u toku dva mjeseca imali su redovan režim treninga (4 puta nedjeljno) i takmičili su se u okviru pionirske Beogradske lige. U inicijalnom i finalnom mjerenju praćeno je 13 morfoloških obilježja. Na osnovu dobijenih rezultata može se zaključiti da fudbaleri eksperimentalne grupe koji su koristili matični mliječ u finalnom mjerenju u odnosu na inicijalno imaju statistički značajno povećanje tjelesne visine i mišićne komponente, a smanjenje masne komponente. Takođe, prisutno je i statistički značajno povećanje obima natkoljenice i potkoljenice kod eksperimentalne grupe na kraju eksperimentalnog perioda. Ispitanici eksperimentalne grupe su imali prosječno veće vrijednosti u tjelesnoj visini, tjelesnoj masi, mišićnoj komponenti i koštanoj komponenti, a manju prosječnu vrijednost masne komponente.

Ključne riječi: *matični mliječ, suplement, mišići, mast i komponente kosti*

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