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NUTRITION ANALYSIS OF HIGHLY QUALIFIED JUDO ATHLETES BASED ON NUTRIGENETIC STUDIES

D.E.Makhmudov
Republican Scientific and Practical Center for Sports Medicine
A.A.Sadikov
National Anti-Doping Agency of the Republic of Uzbekistan

Abstract: This article discusses the polymorphisms of genes that are the basis for creating the diet of judoists, the issues of rationalizing nutrition against the background of physical activity and fitness of athletes based on the data obtained from nutrigenetic testing, which can serve as a platform for a personalized approach to the diet.

Keywords: highly qualified athletes, judoists, nutrigenetic test, actual nutrition, balanced diet, low-carbohydrate diet, low-fat diet, physical qualities.

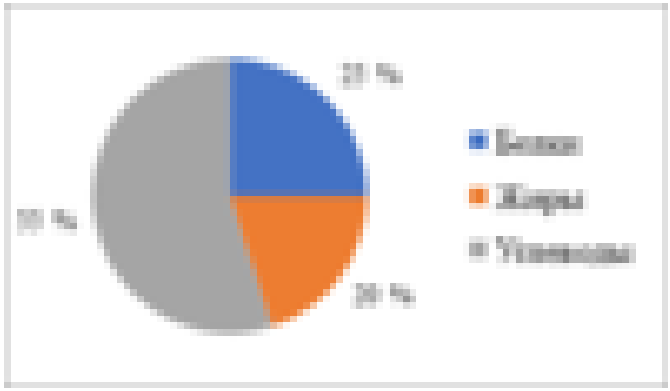
Introduction. In the process of training highly qualified judokas, today, one of the urgent issues that a coach has to solve is a rational and balanced diet [2]. According to numerous studies in the field of sports performance, it has been proven that during a fight, the wrestler's energy costs increase several tens of times compared to the state of rest, which must be constantly restored and, as a rule, the coach and athlete need to know how to eat [7]. The nutrition of athletes must be complete. It is important to maintain a balance in the content of macronutrients in the body (fats, proteins, carbohydrates. The success of the training and competitive activities of any judoist largely depends on how well the personalized approach to nutrition is developed [4] . It is not enough to have an abundance of food, it is necessary to have knowledge about the nutritional value of products, the correct diet, hygienic conditions that ensure the good quality of food [3].

Currently, one of the popular directions is the development of ways to individualize fitness programs for weight control based on genetic analysis data . Some of these early approaches have already been patented and are beginning to be put into practice [5] . Among the genetic factors that can affect the correct choice of diet and intensity of physical activity [1] , the nucleotide polymorphisms of the FABP2, PPARG, ADRB2, and ADRB3 genes are most often analyzed. These genes, or rather their genetic variability, greatly affect how quickly and efficiently nutrients from food are absorbed. These genetic variations (polymorphisms) are not pathogenic mutations, they are quite widespread, but having information about their presence or absence, one can more accurately assess the individual characteristics of one's organism [6].

The purpose of the study: to analyze the actual nutrition of judo athletes, to assess the compliance of the food menu in a comparative characteristic with the indicators of nutritional testing athletes based on the results of general and special physical training

Materials and methods of research: in the course of the research, 14 highly qualified athletes specializing in martial arts (judo) of male (78.5%) and female (21.5%) gender were examined, the average age of which was 25.4 ± 2.37 during training camps. Actual nutrition was assessed by analyzing the finished weekly menu in terms of macronutrient composition of nutrition (BZhU), the energy value of the diet and its balance. Genetic analysis data each athlete was carried out by the method of nutrigenetic testing using PCR kits of the SPF " Litekh ", Panel "Metabolism" of nucleotide polymorphisms of the FABP2, PPARG, ADRB2 and ADRB3 genes. To assess personalized nutrition, tests used in martial arts based on the analysis of the athlete's physical fitness indicators using pedagogical testing methods were used. The physical quality of athletes was assessed by a set of test exercises according to their sports qualifications and skills. The processing of the primary material was carried out by a statistical method using the program Statistic a 10.0, Russian version. The results are presented as mean and standard error of the mean.

Research results. According to the analysis of the actual nutrition of the studied judo wrestlers during the training camp, it was found that the diet for one week in terms of proteins, fats and carbohydrates is equal to the ratio 25%:20%:55% of total calories (Fig. 1).



Picture 1. Analysis of the nutritional balance of judo wrestlers by macronutrient composition

To select the personalized nutrition of the studied athletes, we conducted nutrigenic testing (Table 1). Based on the laboratory data obtained, each athlete received a recommended diet (balanced , low fat and low carbohydrate).

Table 1
Indicators of nutrogenetic testing of highly qualified judo wrestlers

Floor	PPARG2 rs1801282	ADRB2 rs1042714	ADRB2 rs1042713	ADRB3 rs4994	FABP2 rs1799883	Recommended Diet
m	CC	CC	AA	TT	GG	balanced
m	CC	CG	AG	TT	AA	low fat
m	CC	CC	AA	TT	GG	balanced
and	CC	CC	AA	TT	GG	balanced
m	CC	CC	AG	TT	GA	low fat
and	CC	CC	AA	TT	GA	low fat
m	CC	CC	AA	TT	GA	low fat
m	CC	CC	AA	TT	GA	low fat
m	GG	CG	GG	TT	GG	low carb
m	CC	CC	AG	TT	GA	low fat
m	CC	CG	AG	TC	GA	low fat
m	CG	CC	AA	TC	GA	low carb
and	CC	GG	GG	TT	AA	low fat
m	CC	CC	AG	TC	GG	balanced

According to the rules for selecting a rational menu for an athlete, a balance of three main macronutrients : carbohydrates, proteins and fats is a must. So with a recommended balanced diet, the percentage of these macronutrients has the following ratio: carbohydrates 55%, proteins 20%, fats 25%. In a low-fat diet, the percentage of BJU is: carbohydrates 65%, proteins 15%, fats 20%, while the amount of fat in the diet should not exceed 40 grams per day. A low-carbohydrate diet includes a percentage of carbohydrates -45%, proteins - 20%, fats -35% (sparing option). The amount of carbohydrates in the diet should not exceed 200 grams per day. With a low-carbohydrate diet, more protein foods are consumed. It is allowed to include in the main diet and fat-containing foods that provide the main 50-55% daily source of calories and give a feeling of satiety.

Based on the conducted nutrigenetic tests, the studied judokas were recommended to change their diet. As can be seen in Figure 2, a low-fat diet is recommended for the largest percentage of surveyed judokas, a balanced diet is in second place, and the lowest percentage is given to a low-carbohydrate diet.

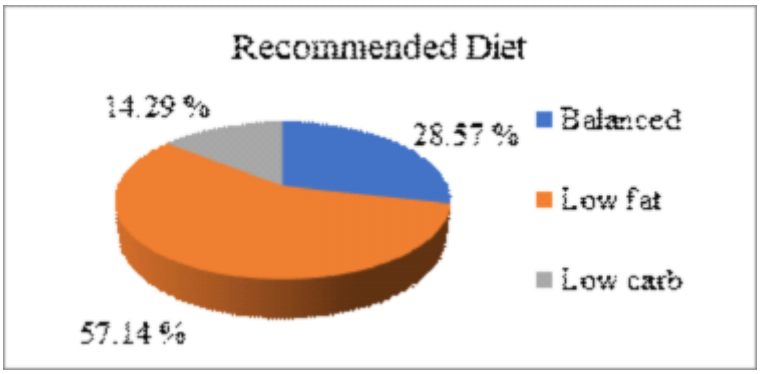


Figure 2. Results of nutrigenetic testing of judo wrestlers (n = 14), in %

According to the goal of this study, a comparative analysis of the diet of judokas before and after nutrigenetic testing was carried out. So the actual nutrition of the sports federation of judo according to main macronutrients was a percentage of 25%:20%:55%, which is significantly different from the recommended diet based on nutrigenetic tests (Table 2)

Table 2
Analysis of the menu of highly qualified judokas

macronutrients	Recommended			Actual
	Balanced	low carb	low fat	
Protein %	20	20	15	25
Fat %	25	35	20	20
Carbohydrates %	55	45	65	55

Evaluation of the rationality of nutrition on the basis of the analyzes of the two compared menus (before and after nutrigenetic testing) was carried out on the basis of the data obtained on the physical qualities of judo wrestlers in a number of pedagogical tests corresponding to their sports specialization and sports qualification (Table 3).

Table 3
Results of general and special physical training, n =14

Diet	Physical Qualities				
	Flexibility, in points	Power, in watts	speed power, in cm	Hand dynamometer, in kg	
				right	left
Menu before nutrigenetic studies	4.2±0.89	1045.8±184.06	46.2±3.77	49.3±10.0	44.6±8.98
Personalized menu based on nutrigenetic research	4.3±0.91	1125.0±207.10	50.8±7.51	56.5±13.63	49.5±11.4

As can be seen from Table 3, the physical qualities of judo wrestlers have improved significantly with a personalized approach to the nutrition menu recommended based on the obtained results of nutrigenetic testing for all indicators.

Conclusion. On the basis of the study, it can be judged that the nature of nutrition of judoka athletes affects physical qualities, the selection of an individual diet largely depends on the percentage of proteins, fats and carbohydrates of inherited genetic variants. A high level of athlete's performance can be achieved by taking into account individual needs for nutrients based on congenital and genetically acquired characteristics. However, this study did not establish a clear relationship between genotype and nutritional characteristics, so further and mandatory randomized clinical trials are needed.

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