YEDİTEPE UNIVERSITY

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Master's Degree Program

AN ANALYSIS ON THE NUTRITIONAL STATUS OF JUNIOR AND PUBESCENT SWIMMERS RECEIVING CONSULTANCY ON NUTRITION AND THE CHANGE IN THEIR BODY COMPOSITIONS IN THE WAKE OF CONSULTANCY

Aysen ARICAN

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ABSTRACT

This study was conducted for the purpose of analyzing the changes in the body compositions of junior and pubescent/adolescent swimmers according to the frequency of the consultancy received from a dietician trained and involved in nutrition for athletes.

In our study, 54.1 % of 168 swimmers who received nutrition consultancy between 2007-2012 (in the 5-year-period) consisted of males. The average age, on the other hand, was found to be 12.68±2.15. Considering how often the swimmers visited the dietician, it was seen that 59.4% of them had visited the dietician 2-4 times, whereas 27.1% of them had visited the dietician 5-8 times, and 13.5% of them had visited the dietician 9 times and more.

Considering the distribution according to the targets of the swimmers, it was found that 39.1% responded with an increase in their performance, while 36.1% of them responded with strengthening in their muscles and 19% of them responded with losing their weight.

When the initial and final measurement results of the swimmers were examined, the differences among the measurement averages of height, weight, muscle, water and BMR were found to be statistically significant.

In conclusion, the nutritional habits of the swimmers participating in the research changed in a healthy way to a significant degree. In particular, the swimmers who needed to gain or lose weight can be said to have reached their targets. The anthropometric measurements of the athletes returned to the desired level after the healthy diet practice under the guidance of a dietician.

This study suggests that athletes, their families and coaches need to receive a dietary education and training under the guidance of dietary/nutritional information supported by scientific researches (threpsology).

The best sources that athletes, their coaches and families can get a dietary training from are dieticians. The maintenance of efficient dietary trainings is essential in terms of the fact that the trainings received in this respect change nutritional habits. The importance of nutrition must be emphasized for the success and health of athletes.

Key Words: Junior and Pubescent Swimmers, Nutrition Consultancy, Body Composition, Dietician.

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CONTENTS

ABBREVIATIONS

Acceptable Macronutrient Distribution Range : AMDR

Adenosine Triphosphate : ATP

Adequate Intake : AI

American College of Sports Medicine : ACSM

Basal Metabolic Rate : BMR

Body Mass Index : BMI

Body Weight : BW

Carbohydrate : CARB (cho)

Calcium : Ca

Chlorine : Cl

Copper : Cu

Centers For Disease Control and Prevention : CDC

Daily Grams : DG

Daily Value : DV

Estimated Energy Availability : estEA

Essential Amino Acid : EAA

Fat-free Mass : FFM

Fractional Synthetic Rate : FSR

Glycemic Index : GI

High Protein : HP

International Society of Sports Nutrition : ISSN

Iron : Fe

Low Protein : LP

Magnesium : Mg

Medium Protein : MP

Phosphorus : P

Potassium : K

Protein Digestibility Corrected Amino Acid Score: PDCAAS

Recommended Dietary Allowances : RDA

Skinfold Thickness Measurement : STM

Standard Deviation : SD

Standard Error : SE

Sodium : Na

Sulphur : S

The Dietary Guidelines Advisory Committee : DGAC

Total Iron Binding Capacity : TIBC

The American Dietetic Association : ADA

The United States Department of Agriculture : USDA

The National Health and Nutrition Examination Survey : NHANES

The United States of America : USA

Waist-hip ratio : WHR

World Health Organization : WHO

LIST OF TABLES

1. INTRODUCTION

The main objective of the international health politicies is to attain a healthy society consisting of healthy individuals. In order to attain a healthy society, there is the need to develop policies which reinforce cross-sectoral collaboration. In our country, one of the national programmes run to enable our citizens to attain the maximum health level is the '' Turkey Healthy Eating and Active Life Program'', which was launched in 2010, and this programme was updated for the years 2014-2017, after which the '' Turkey Healthy Eating and Active Life Program'' was established with a cross-sectoral approach. (1). During Finnish Presidency of the European Union (EU) in 2006, the concept of "Health in All Policies (HiAP)'' was used for the first time. (2). Here, it is stated that the social determinants of health (educational level, income and employment status, etc.) play a key role in the approach to a healthy society. The important role of communication and education is highlighted in order to be able to succeed in the studies regarding the development of health and inspire desirable healthy behaviours in our citizens as well as improving such social determinants. (3).

Within this scope, according to WHO (as it is stated in 1948 WHO regulations), health is not only the state of non-existence of diseases or disabilities but it is also the social and psychological state of welfare. (4). On the other hand, nutrition is the ability of a person to take in his/her body the essential elements for growth, development and longevity as a healthy and productive individual. (5). As for the nutrition for athletes, in a more particular sense, it is aimed that the general health of athletes be maintained and their performances be enhanced besides a healthy and adequate nutrition. Despite the fact that the energy and nutrient requirements of athletes differ in terms of age, gender and sports branches, the basic nutrition rules are similar for all athletes. (6).

In the literature, there are numerous evidence-based releases/journals researching into the connection between exercise and welfare.

Nutrition for athletes constitutes a significant part of the sense of competition and training program of every athlete. Rules based on valid scientific evidences with respect to the amount, quality and timing of food intake protect athletes from injuries and provide a more efficient performance by reducing the disease risk. Proper dietetics and health complement each other through the educational conformation/ adaptation according to personal metabolic tendencies. It is necessary to consume various types of foods/nourishments which provide carbohydrates, proteins, fat and micronutrients for adequate energy. (7).

Exercise and Sports Science Reviews (ESSR) released/published a series of articles regarding the nutrition in sports for the International Olympic Committee (IOC). The date of the first releases was 1991. In 2003, another consensus updated these prepared guidelines, starting from 1991. More recently, the journals/articles concerning sports nutrition have been published in the special issue of IOC Journal of Sports Sciences, 2010. In these documents was ‘’ the relationship between nutrition, performance and health in sports’’ scientifically analyzed. The International Society of Sports Nutrition (ISSN) released 2 (two) consensus reports. The first of these is the 2008-journal focusing on the nutrient timing. The consensus in 2010, on the other hand, makes recommendations on nutrition for athletes and exercises. (7).

Nutrition for athletes is a continuously developing field with hundreds of researches published/released each year. For this reason, it is rather difficult for the experts to keep their knowledge updated and in concordance with the literature. The sustenance of the energy balance and nutrient-dense/nutrient-rich diet, an attentive training, the accurate timing of food intake and an adequate amount of rest are the milestones for the development of an athlete’s performance and the adaptation to training.

Starting from 2004, Kreider et al., in their article published in JISSN (Journal of the International Society of Sports Nutrition) regarding ‘’ the optimization of athletic performance through nutrition and training’’, classified the food supplements as “apparently effective’’, “possibly effective’’, “too early to tell’’ and “apparently ineffective’’. Again, according to this article, in order to prevent dehydration during exercise is the key to maintain exercise capacity, particularly in hotter and humid environments. Those who do intensive exercises or work hard in hot summer weather require to drink water or sports drink frequently. (E.g. 1-2 glasses every 10-15 minutes). Here, the purpose should be not to lose 2 % of body weight at most during the exercise. (e.g. 180 ıbs (for 81. 65 kg) x 0.02 = 3.6 ıbs (1.63 kg))(8) .

The energy requirement of each athlete is different. The energy requirement in athletes is calculated by adding the daily physical activity (taking into account the type, intensity and duration of the exercise done) to the basal metabolic rate (the energy expended while awake at the time of absolute rest/recreation after the nutrients taken in have been digested). (9).

55-70 % of body weight is composed of water, depending on the number of muscles in the body. It is known that the athletes who maintain the fluid balance during exercise reach an optimal exercise performance and that the progressive dehydration (decrease in the amount of fluid in the body) affects the performance in a negative way. Separately, dehydration in athletes increases the risks of life-threatening heat exhaustion and heat stroke. (10).

The athletes should consume an adequate amount of fluid before, during and after the exercises. Even slight dehydration (body fluid loss) affects the performance negatively. (10).

The objective in the nutrition for athletes is to allow the athlete to get adequate and balanced nutrition based on his/her age, gender, physical activity, nutritional habits and energy consumption. For most athletes, on the other hand, apart from the general nutrition rules, having the knowledge of nutrition particular to the sports branch practiced is of great importance. (11).

Besides the fact that the basic differences among sports branches result from the contribution of the utilized energy systems and the required nutrients to the overall energy, the most important nutrients for athletes are basically carbohydrates. It is known that although the protein requirement increases in the sports branches which require strength/power and in the athletes who have greater muscle mass, other nutrients, such as vitamins, minerals and fat should also be consumed on an adequate level. Providing adequate amount of hydration is important for all athletes, and the fluid loss should be replaced by keeping track of the pre and post training weight loss. It must be kept in mind that nutrition, for all athletes, should be unique to the individual even though they may be in the same sports branch, and the athletes should be provided with necessary infromation on nutrition. (11).

In the field of Nutrition and Exercise, 3 large associations (the American Dietetic Association (ADA), American Sports Medicine Institute (ASMI) and the Dietitians of Canada (DC), by getting together, formed a common/shared platform dealing with Nutrition for Athletic Performance in 2009. In this platform, the authors recommended the following after having researched into nutritional practices for athletes that would enhance their performance:

‘’ Don't weigh yourself daily! Protein recommendations for both endurance & strength -trained athletes range from 0.5 to 0.8 grams per pound (1.2-1.7 g/kg) body weight.

Athletes in power sports need to pay attention to carbohydrates, and not just protein. Athletes who eat enough calories to support their athletic performance are unlikely to need vitamin supplements.

If you are vegetarian, a blood donor, and/ or a woman with heavy menstrual periods, you should pay special attention to your iron intake. Eating before hard exercise, as opposed to exercising in a fasted (hungry) state, has been shown to improve performance. When you exercise hard for more than one hour, target 30 to 60 grams (120 to 240 calories) of carbohydrate per hour to maintain normal blood glucose levels and enhance your stamina and enjoyment of exercise. For optimal recovery (to close the gap), an athlete who weighs about 150 lbs. (63 kg) should target 300 to 400 calories of carbs within a half-hour after finishing a hard workout. Whether or not you urgently need to refuel depends on when you will next be exercising. Including a little protein in the recovery meals and snacks enhances muscle repair and growth. Muscle cramps are associated with dehydration, electrolyte deficits, and fatigue'' (12).

In short, in the light of all of this information, in order to first protect the health of athletes and then enhance their performances, the world literature regarding nutrition should be very well followed and the conducted studies should be evaluated with great care.

In this study of mine, by using the 'Athlete Data Form'' and body analysis results, I have aimed at analyzing the nutritional status of junior and pubescent swimmers receiving nutrition consultancy from a dietician trained and involved in nutrition for athletes, and the change in their body compositions in the wake of consultancy.

2. GENERAL INFORMATION

It goes without saying that nutrition has an important role in the high performance exhibited by athletes. Nutrition for athletes means allowing the athlete to proceed further, enabling his/her success and providing him/her with the opportunity to do sports in a healthy way. However, an athlete has an adequate and balanced diet only by having the nutrients that the type of sports he performs requires (16).

As is known, sports are examined in three sections as endurance sports, strength/power sports and team sports. Due to the fact that the swimmers diet/nutrition, which falls within the field of this study, falls also within the endurance area of swimming, the focus should be on nutrition in Endurance Sports.

The International Society of Sports Nutrition (ISSN) released two consensus documents: the former was released in 2008 and the latter in 2010. These reports are based on the researches containing the recommendations on nutrition and exercise programs for athletes (8).

The American Dietetic Association (ADA), American Sports Medicine Institute (ASMI) and The Dietitians of Canada and the American College of Sports Medicine (ACSM) collected the issues based on nutrition and performance of athletes, starting from the year 2000 until 2009 (17,18). These consensus reports include various views based on fluid and physical activity, individual nutrition and supplements for athletes (8, 16-21).

In Potgieter's article in 2013 concerned with nutrition for athletes, Potgieter evaluated and summarized the key concepts, elements for the matter involved and the consensus reports at issue with a critical speech. He stated in this study that the existence of the guidelines presenting the amount, quality and timing of food intake on the basis of evidence-based scientific methods was quite important for health care professionals.

These guidelines are of vital significance for the physically active individuals and athletes to do efficient trainings. Thus, the exercise performance will increase while the risk of injury and disease diminishes. (7).

In the report of ISSN published in 2010, there are evaluations on the definitional category of ergogenic aids and dietary supplements, the legal regulations of dietary supplements, scientific assessments of dietary supplements, general nutrition strategies and optimization of performance in terms of scientifically-based training and nutrition practices, and also on understanding the ergogenic value of dietary supplements and nutrition in terms of improving the recovery, and weight gain, weight loss and performance development (8).

In the booklet, '' Nutrition for Athletes'', published in 2008 by The Ministry of Health, General Directorate of Primary Health Care Services, Department of Nutrition and Physical Activities, it is cited : "it is agreed that an adequate and balanced diet does not guarantee the success of an athlete; yet, malnutrition gives rise to several health problems and decrease in performance'' (6).

According to the international dieticians, the goal in nutrition for athletes is to protect /maintain the health of an athlete and enhance his/her performance. Besides the fact that the requirement of an athlete for energy and nutrients differ through the parameters, such as the type of sports s/he does, age and gender, it basically has the similar nutrition rules /principles (6-8).

A good diet program helps boost the endurance exercises, metabolic adaptation and the recovery of muscles as well as assisting an intensive training. It is essential that ideal food/diet groups providing carbohydrates, protein, fat and micronutrients for adequate amount of energy be expended (6-8, 17, 18).

The advantages of optimum nutrition for athletes can be considered as developing the athletic performance, optimization of body condition, helping to relieve tiredness and minimizing disabilities. (20-22).

2.1.Energy Intake

The first component of nutrition in order to provide an optimal training and performance is to enable an adequate amount of calorie consumption that will balance the energy expenditure of an athlete. People enrolling in a general sports program (exercises for 30-40 minutes per day and three times a week,) can fulfil their energy needs through a normal diet (e.g. 25/35 kcal/kg/day or 1.800-2.400 kcal/day for an individual weighing 50-80 kg.), because their calorie expenditure / deficit resulting from the exercise is not that much. In spite of this, athletes are involved in intensive training programs (e.g. intensive exercise program for 2-3 hours per day and 5-6 times a week) or over- intensive heavy/hard training programs (e.g. intensive exercise program for 3-6 hours per day and 5-6 days a week), and their calorie requirement can be expanded to 600-1.200 kcal or more throughout the exercise (7, 8).

2.2. Energy and Available Energy

Energy requirement changes depending on the factors, such as gender, age, body size and composition (height, weight, amount of body fat, amount of fat-free tissue), the type, intensity and frequency of the exercise practised (6).

A well-balanced diet should contain adequate amounts of calories in order to maintain the energy balance of the individuals whose energy requirements have increased due to physical acitivity. Yet, it might still be difficult to meet the energy needs of athletes whose body weight and height are at high levels. The negative energy balance is quite general in the athletes of endurance sports (e.g. runners, bike racers, swimmers) (7).

The optimum athlete performance may be provided by adequate amount of energy intake.

Energy balance means that the energy intake is equal to the energy expended, or it is the basal metabolic rate (BMR) which is the total energy expenditure (TEE) (The equivalence of the thermal impact of the nutrients and the activity; the Non-exercise activity thermogenesis (NEAT) of the energy expended in a planned / an organized physical activity) (23). In the event that inadequate energy is taken in for a long time, the energy required by an athlete is then provided by the stored fat in the body. In this case, decrements in the muscle tissue (negative energy balance) are observed along with the weight loss (losing weight), and the performance declines along with the loss of strength and endurance (24). The persistence of negative energy balance reduces the body mass by causing a loss of skeletal muscle mass and fat. The reduced skeletal muscle mass has numerous negative consequences; among these negative consequences are the suppressed basal metabolic rate, decreased protein conversion, low physical performance and increasing risk of injury. The response of the skeletal muscle mass to the negative energy balance is in the form of degredation and imbalance/instability in the muscle protein synthesis rate. The recent studies suggest that the skeletal muscle losses can be reduced by regulating the muscle anabolism and proteolysin intracellularly through the $0.8 g/kg^{-1}$ d^{-1}

protein intake in the diet. (25).

It is recommended that the athletes of endurance sports supply 70% of their calorie needs from carbohydrates, 15-20% from fats and 10-15% from proteins. One can increase the calorie s/he needs in two ways (26):

- Enhancing the physical activity: the total calorie requirement increases through more calorie burn.

- Reduction in food consumption in parallel to the decrease in the energy density.

2.2.1.Estimating the Required Energy In Meal Planning

It is more appropriate that the voluntary energy be calculated in different groups.

According to the data of The United States Department of Agriculture (USDA), the essential calorie is calculated on the basis of the estimated nutrients and required energy (26).

Required Energy = Estimated total daily energy requirement – essential energy calorie

Estimated daily energy requirement = A+B* age +PA (D* weight +E* height) (27)

A= 662 in males, and 354 in females

B= age impact factor is 9.53 in males, and 6.91 in females

PA= physical activity impact factor

Table 2 1 Physical Activity Impact Factor / The Impact Factor in Physical Activity

	Male	Female	
Sedentary	1.00	1.00	PAL >1.0<1.4)
Moderately Active	1.11	1.12	PAL >1.4<1.6)
Active	1.25	1.27	PAL >1.6<1.9)

According to the suggestions of ISSN, the nutrient- energy distribution is shown in Table 2-1; the energy requirement calculated according to the body weight and physical activity is shown in Table 2-2. (28).

Table 2-2 The USDA Distribution Table of Nutritional Target for Daily Nutrient Intake

NUTRIENT		PROTEIN		CARBOHYDRATES		SUGAR ADDED	TOTAL FIBRE	TOTAL FAT	SATURATED FAT	CHOLESTEROL	LINOLEIC ACID		α- LINOLEIC ACID	
Target Source		RDA	AMDR	RDA	AMDR			AMDR	DG	DV	AI	AMDR	AI	AMDR
		(g)	(%)	(g)	(%)	(%)	(g)	(%)	(%)	(mg)	(g)	(%)	(g)	(%)
Type of Nutrient	Target Group													
Calorie														
1000	Kids 1-3	13	5-20	130	45-65	<25%	14	30-40	<10%	<300	7	5-10	0,7	0.6-1.2
1200	Women 4-8	19	10-30	130	45-65	<25%	17	25-35	<10%	<300	10	5-10	0,9	0.6-1.2
1400	Men 4-8	19	10-30	130	45-65	<25%	20	25-35	<10%	<300	10	5-10	0,9	0.6-1.2
1600	Women 9-13	34	10-30	130	45-65	<25%	22	25-35	<10%	<300	10	5-10	1	0.6-1.2
	Women 51-70, 70+	46	10-35	130	45-65	<25%	22	20-35	<10%	<300	11	5-10	1,1	0.6-1.2
1800	Men 9-13	34	10-30	130	45-65	<25%	25	25-35	<10%	<300	12	5-10	1,2	0.6-1.2
	Women 14-18	46	10-30	130	45-65	<25%	25	25-35	<10%	<300	11	5-10	1,1	0.6-1.2
	Women 31-50	46	10-35	130	45-65	<25%	25	20-35	<10%	<300	12	5-10	1,1	0.6-1.2
2000	Men 51-70, 70+	56	10-35	130	45-65	<25%	28	20-35	<10%	<300	14	5-10	1,6	0.6-1.2
	Women 19-30	46	10-35	130	45-65	<25%	28	20-35	<10%	<300	12	5-10	1,1	0.6-1.2
2200	Men 14-18	52	10-30	130	45-65	<25%	31	25-35	<10%	<300	16	5-10	1,6	0.6-1.2
	Men 31-50	56	10-35	130	45-65	<25%	31	20-35	<10%	<300	17	5-10	1,6	0.6-1.2
2400	Men 19-30	56	10-35	130	45-65	<25%	34	20-35	<10%	<300	17	5-10	1,6	0.6-1.2
2600	Men 19-30	56	10-35	130	45-65	<25%	36	20-35	<10%	<300	17	5-10	1,6	0.6-1.2
2800	Men 14-18	52	10-30	130	45-65	<25%	39	25-35	<10%	<300	16	5-10	1,6	0.6-1.2
3000	Men 19-30	56	10-35	130	45-65	<25%	42	20-35	<10%	<300	17	5-10	1,6	0.6-1.2
3200	Men 14-18	52	10-30	130	45-65	<25%	45	25-35	<10%	<300	16	5-10	1,6	0.6-1.2

Table 2-3 Energy Requirement in Physical Activity

Physical Activity Level	Kcal/kg/day	Kcal/day
General Physical Activity 30-40 min/day, 3 times a week	Normal Diet 25-30	1800-2400
A Moderate-Intensity Training(MIT) 2-3 hours/day, 5-6 times a week	50-80	2500-8000
Heavy& High Volume Training (HVT) 3-6 hours/day, 1-2 session(s)/day, 5-6 times a week	50-80	2500-8000
Elite Athletes	150-200	Over 12000
Huge Athletes	60-80	6000-12000

The American College of Sports Medicine –ACSM suggests that the energy requirement be calculated in accordance with DRI (Dietary Reference Intake) or the estimated formulas. For instance, Cunningham and Harris-Benedict Equations; the basal or resting metabolic rate are calculated by using the type, duration and intensity of a physical acitivity. The expended energy is also calculated through metabolic formulas (See: Table 2-3, Table 2-4) (18)

Table 2-4 Formulas for Calculating the Daily Energy Requirement - The Harris-Benedict Method

Adult Male	**Adult Female**
BMH=66+13.7 (Body Weight kg) +5.0 (Height cm) – 6.8 (Age- year)	BMH=655+9.6 (Body Weight kg) +1.8 (Height cm) – 4.7 (Age-year)
Co-efficients/ Parameters According to the Activity Level Activity Coefficient	
% of BMR	**Activity Level**
%20-30	Sedentary (resting/relaxing level)
%30-45	Low Level of Planned Activity (such as wandering/touring)
%45-65	Moderate Level of Planned Activity (such as brisk walking)
%65-90	Heavy A few hours of exercises in addition to the daily routine acitivities
%90-120	Heavy& Highly Intensive Acitivity (competition/race/training)

Table 2-5 Formulas for Calculating the Daily Energy Requirement-The Dietary Reference Intake (DRI) Method

Adult Male	Adult Female
662-9.53 (age-year) + FA [15.9 (Body Weight kg) + 539 (Height cm)]	354-6.91 (age-year) + FA [9.36 (Body Weight kg) + 726 (Height cm)]
Physical Activity (PA)	**Physical activity (PA)**
1,0 Sedentary	1,0 Sedentary
1,11 low activity	1,12 low activity
1,25 active	1,27 active
1,48 very active	1,45 very active

The consensuses of 2003 and 2010 report that the estimated energy availability (*est*EA) should be calculated according to the total energy requirement. The estEA is defined as the energy taken in through diet minus the energy expended during exercise. (Energy Availability-EA=Energy Intake-EI - Energy Expended during Exercise-EEE). The energy balance cannot provide the appropriate information for the energy requirement and is not practical in calculating the energy required by an athlete. It was found out that the $_{est}$EA proved to be 30 kcal/kg FFM (fat-free mass) less when the menstrual cycle of a female athlete became irregular and her bone health failed (29).

According to the recommendations of IOC's 2010 consensus, the $_{est}$EA management is the intake of planned amount of nutrients by athletes at a scheduled time throughout the day. Such a diet, as well as minimizing the harmful weight loss strategies and practices without allowing time for hunger, provides the transformation of diet according to the training periods and helps reduce body weight and fatness/obesity while exercising. Thus, the diet and energy regimen/diet that makes the $_{est}$EA 30-45 kcal/kg FFM/day is maintained/ preserved (29, 30).

2.2.2.Macronutrient Requirement

- **Carbohydrates**

The main task of carbohydrates (CARB), the basic source of energy for athletes, is to provide energy for the body. Separately, referred to as sediments, the carbohydrates which are not broken down by the digestive enzymes also accelerate the functioning of the large intestines/bowels and prevent the harmful wastes from resting in the intestines for a long time (31).

CARBs are examined in two groups as simple and complex carbohydrates, and athletes are recommended to consume complex carbohydrates instead of simple ones in terms of their performance and health (32).

The main source of energy during exercise is carbohydrates. Carbohydrates taken in through nutrients are stored as glycogen in the liver and muscles. 300-400 g of glycogen is stored in the muscles, while about 75-100 g of it is stored in the liver. Athletes can increase their glycogen storages almost 1.5-2 times more through a high-carbohydrate diet. The more glycogen storages the athletes have, the higher their performances will be (7).

The fact that the athletes getting high energy take in 50% of that energy from carbohydrates meet the amount of carbohydrates recommended per weight (7-8 g/kg), whereas in the event that the daily energy is less than 2000 kcal, even providing 60% of the energy from carbohydrates cannot be sufficient for the amount of carbohydrate per weight. (4-5 g/kg). For this reason, in calculating the carbohydrate requirements in the athletes receiving high and low energy in particular, the calculation must be done by taking into account the values recommended both per percentage and per body weight together (32). Athletes require more CARB when compared with sedentary individuals. Muscle glycogen and blood glucose are the primary energy sources for muscle contraction. The optimal CARB intake along with the diet ensures recovery and increases the glycogen storarages for the next training. The amount of CARB taken in through the daily diet differs according to the intensity of the training. The groups of the low-moderate glycemic index that contain more complex CARB must be focused on.

In Table 2-5, the amounts of CARB according to the type of physical activity are given (33).

Table 2-6 CARB Intake According to the Physical Activity Level

Physical Activity Level	g/kg/day	Content- information
Daily or general CARB Intake		
ACSM		
Athletes	6-10 g/kg/ BW/day	Depends on the amount of energy expended by the athlete as well as the type of sport, gender and environment
ISSN		
General Physical Activity, 30-60 min/day, 3-4 times a week	3-5 g/kg/ BW/day	Complex CHO (CARB)
Moderate-High-Heavy VolumeTraining, 2-3 hours/day, 5-6 times a week	5-8 g/kg/ BW/day	Measured GI low
High Volume, Heavy Exercise, 3-6 hours/day, 1-2 season(s), 5-6 times a week	8-10 g/kg/ BW/day	Concentrated CHO
IOC		
Low-intensive or body form-based activities	3-5 g/kg/ BW/day	
Moderate exercise program, ~1 hour/day	5-7 g/kg/ BW/day	Includes the pre, during and post training intakes
Endurance program, average high intensive,1-3 hours/day	6-10 g/kg/ BW/day	Individual Tolerance and Preference
Athletes exercising strength	4-7 g/kg/ BW/day	Selection of Nutritional Density
Overload, Moderate high-intensive training, >4-5 hours /day	8-12 g/kg/ BW/day	

Glycemic Index (GI) is the measure of how quickly blood glucose levels rise after consuming the nutrient (34) also it is known that glycemic index is effective in preventing

the decrease in the performance of athletes, delaying their tiredness, balancing blood glucose levels and in restoring the muscle glycogen storages during the recovery period (7). The glycemic effect of the nutrients are classified as High-Medium and Low.

CARBs, in addition to the amount of consumption, show a glycemic effect according to their textural/tissular, structural and absorptive characteristics rather than their molecular weight (35). The timing of CARB intake is quite important in terms of GI (7). Athletes of endurance sports should consume nutrients containing low GI prior to the exercise, since these nutrients slowly release glucose into the blood stream, and thus, the decrease in blood glucose is prevented.

Throughout the exercise/training, consuming nutrients with medium and high GI increases the use of CARB, as the result of which the blood glucose level is protected. In the wake of the training, on the other hand, athletes should consume nutrients with high GI in order to pull the muscles together and protect the glucose levels.

In Table 2-6, the amounts of CARB to be consumed before, during and after training are given (7, 35, and 36).

Limited glycogen storages in the human body can suffice for approximately 90 minutes to 3 hours throughout the moderate-high intensity training. Carb-loading is the overall strategies which vary according to the type of diet and training that will allow the maximum blood glucose to be stored during the exercises of endurance sports that will last more than 90 minutes. Such a strategy, by increasing the blood glucose level, keeps endurance and performance at maximum (33).

Common complaints involving muscle weakness and hypoglycemia in the cases of endurance are often the result of the low blood glucose level. As in the optimal fluid intake, glucose is required in the liver for a rapid increase of performance in the muscle glycogen storages (7, 33).

The decrease or depletion in the glycogen storages in athletes which could occur after training or be due to inadequate carb intake may lead to chronic fatigue or overtraining syndrome (32). Different recommendations from ACSM, ISSN and IOC groups for the CARB intake after training are given in Table 2-6. While ACSM gives quite a wide range of recommendations, ISSN and IOC give their recommendations for the CARB requirement depending on the intensity and duration of the program according to different groups. ACSM emphasizes that an individual plan should be developed for the matter involved.

Table 2-7 CARB Intake According to the Physical Activity Level Before, During and After Training

CARB requirement prior to training			CARB requirement during training			CARB requirement after training		
Physical Activity Level	**g/kg/day**	**Content-information**	**Physical Activity Level**	**g/kg/day**	**Content- information**	**Physical Activity Level**	**g/kg/day**	**Content- information**
ACSM								
Pre-meal State	200-300 g, 3-4 hours before	Low fat and fibre High CARB, moderate protein	>60 Dk. During training	0.7 g/kg/ BW/hour(s) or 30-60 g/hour	If no meal is taken before training, or particularly important in the case of temperature and humidity during training %6-8 K solution Primarily glucoseNot merely fructose-effective, may cause diarrhea Glucose, fructose mixtures, other simple sweets and maltodextrins seem to be more effective. If CARB is provided within the same total amount, KH form is not important (like sports	After Training	1.0-1.5 g/kg/ BW/hour(s), for the first 30 min. and again every 2 hours of 4-6 hours or 30-60 g/hours	***Adequate fluid, electrolyte, energy and CARB***

					beverage, gel and snacks...)			
Physical Activity Level	**g/kg/day**	**Content-information**	**Physical Activity Level**	**g/kg/day**	**Content- Info**	**Physical Activity Level**	**g/kg/day**	**Content- Info**
ISSN								
CARB-loading	8-10 g/kg/ BW/day 1-3 day(s) before the event	High GI CARB diet	60 Dk. Throughout training	30-60 g/hours	1-1,1 g/CARB/min body oxides or 60 g/hour(s) %6-8 CARB/CHO solution Start getting fluid early and have little amounts of fluid every 15-20 min. CHO combinations increase oxidation (CHO/min over 1,21 g) (Glucose, fructose, sucrose and maltodextrins are recommended, since excessive amount of fructose causes diarrhea, it is not recommendable.)	CHO digestion after training	1.5 g/kg/ BW or 0.6-1.0 g/kg BW,again for the first 30 min. and every two hours of 4-6 hours	Within 30 minutes after training

Physical Activity Level	**g/kg/day**	**Content-information**	**Physical Activity Level**	**g/kg/day**	**Content- information**	**Physical Activity Level**	**g/kg/day**	**Content-information**
IOC								
The general energy gained for the activities of >90 min.	**7-12 g/kg/ BW/day**	Reduction in fibre or sediment Individual tolerance Avoiding high-protein-fat and fibre (particularly if there is any complaint of GİS) Low GI, if no CHO was taken in during training	**< 45 min. Throughout training**	No need	**Planning before training** **Supporting the high CHO intake through an increased exercise performance** **Planning: Multi-transformational CHO should be included to enhance the CHO oxidation.**	Fast diet, <8 hours of recovery between two diets	**1-1.2 g/kg/ BW/hours, for the first 4 hours** **Maintaining nutritional requirements afterwards**	Small, regular snacks Compact, CHO-rich nutrients

CHO-rich snacks/appetizers for>60min continuous training or intermittent training	**10-12 g/kg/ BW/day 36-48 hours**	**In a constantly ongoing high-intensity training that lasts for 45-75 min.**	Little amounts, such as gargling
>60 min energy before training.	**1-4 12 g/kg/ BW expended in 1-4 hours before training**	**In endurance trainings involving ''stop and start'' sports that exceeds 1-2,5 hours.**	30-60 g/hours
		In 2,5-3 hour-ultra endurance trainings	Over 90 g/hours

- **Proteins**

The highest levels of macromolecules existing in the organism are the proteins. All proteins are composed of 20 types of naturally-formed amino acids. Therefore, we can resemble proteins to a chain and the amino acids to the rings making up that chain. However, despite the fact that almost all of the 20 amino acids possess the common spine, the side chains (R) differ. Thanks to these side chains, every protein gains a different structure and function (37).

All of the proteins are made up of L-amino acids. In L-amino acids (L=levo, in other words, left), the alpha-amino group exists on the left of the asymmetric carbon atom, and in D-amino acids (D= dexto, in other words, right), on the other hand, it exists on the right. Chiral centers also demonstrate an optical activity (every isomer refracts differently) (37).

20 amino acids involved in the protein structure are of different physical and chemical characteristics due to different side chains they have. These standard 20 types of amino acids can be grouped in a different way. One of the most common groupings is the quadruplet made on the basis of their side-chain polarity: (1) Non-polar or hydrophobic amino acids, (2) Polar but uncharged (neutral) amino acids, (3) Acidic amino acids, and (4) Basic amino acids (38). Amino acids exist in an ionized state in an aqueous medium, and they can act in the form of an acid or a base. Of the amino acids, those containing one carboxyl and one amino group exist in such a medium in a totally ionized state, which are referred to as zwitterions (hybrid). Each of them contains a positive and a negative charge.

Thus, such forms with a zero net charge (neutral) do not act in an electric field (39). Every protein has a particular task and thus, a particular structure. In a sense, proteins are the structures which make the genetic knowledge sensible. There are one or more proteins playing a role in anything that occurs in a living cell. Proteins play a role in numerous occurrences, such as the structural and functional (catalysis) ones. The final way of expression of the genetic knowledge is performed by proteins (39). In a typical cell are

thousands of diverse proteins, each of which is in different amounts. Among the biological macromolecules, proteins are those that exist at most in a cell. Proteins have a great number of biological functions. We can classify proteins in general according to their biological role (39).

Enzymes: These are the most customized/ privatized proteins demonstrating catalytic activity in various numbers. All the chemical reactions which the organic molecules within the cell are exposed to occur through these proteins.

Transport/Transporter Proteins: The proteins in the blood plasma join the particular molecules and ions and transport them from one organ to the other. The hemoglobin within the erythrocytes (red blood cells) binds the oxygen while the blood passes through the lungs and by transporting the oxygen to the peripheral tissues, releases it there. Hence, energy is obtained by providing the oxidation (burning process) of the nutrients. Separately, blood plasma contains the lipoproteins which transport fat from the liver to the other organs. Examples of other transporter proteins can be those that are settled within the cell membrane and that enable numerous agents and ions to be transferred into or out of the cell.

Nutrient and Storage Proteins: Many plant seeds store the essential nutritional proteins for germination. The most important protein of egg white (albumen), the ovalbumin (OVA), and the casein of milk are other nutritional proteins. On the other hand, ferritine contained in animals, plants and some bacteria is a type of protein that stores iron (Fe) within the tissues.

Contractile and Active Proteins: Some proteins are responsible for the resilience, contraction and relaxation and action of an animal or a cell. The first thing that comes to mind is the actin and myosin existing in the skeletal muscles. From the formation of spindle fibers to the formation of flagella, the structures of microtubules, which rank among the significant structures, are made up of protein molecules called tubulin.

The protein requirement in diet is determined by endurance and speed. The energy intake, intensive exercise and the duration of the exercise, the temperature of the environment, gender and age influence the protein requirement (40). Since proteins support the muscle protein synthesis, reduce the muscle protein destruction and muscle damage, protein requirement increases during the trainings of strength and endurance sports. Endurance trainings increase the leucine oxidation.

Thus, the endurance athletes require more protein than other sedentary groups. The protein sources in diet are eggs, and dairy and meat products. The protein quality is measured by Protein Digestibility Corrected Amino Acid Score (PDCAAS) (40). The contribution of proteins to the energy during the exercise is very little. Only during the prolonged exercises does the contribution of the branched-chain amino acids (bcaa) to energy increase in particular. (at a rate of 2-5%). Those who do not do sports require 0.8-1.0 g/kg of protein. In athletes, however, besides the fact that the protein requirement can be calculated by 12-15 % of the energy, it may rise up to 1.2-1.8 g/kg per weight according to the type of the exercise/training (41). As is in all the living things, the athletes' purpose of protein intake in diet is also to help the amino acids by destroying the proteins necessary for the skeletal structure and the hormones that function as the cell membrane receptors and protect the fluid balance (42). Proteins provide our body with benefits, such as the development and protection of muscles, nourishment of tissue connections, providing healthy and quality cells, keeping proteins in reserve as the source of energy to be utilized when needed, generating the hormonal systems and ensuring that they function properly, strengthening and developing/building up the bone structures, being beneficial in healing the wounds of the body, enabling the immune system to work properly, retaining the fluid within the vessel/vein, thus, ensuring the fluid balance of our body, allowing the nervous system to invigorate /rejuvenate itself along with the muscles through sports activities, and making the hormonal and muscular processes work at a maximum level during sports activities (7).

One should take in an average of 0.8-0.9g/kg BW (1kg=2.2 Ibs) of protein per kg. a

day. A person of 130 Ibs (almost 59 kg) should take in kg*0,8=47 gr of protein. (About 63 g of protein for a male weighing 70 kg. According to the average calculation, it is suitable that he take in 56-63 gr of protein) (43).

In the studies conducted so far, it has been suggested that excessive intake of proteins or amino acids accelerates urination in order to excrete the urea, which is the excretion product of proteins, thus, more body fluid is lost, leading to dehydration. Besides, excessive protein intake causes the liver and kidneys to get exhausted more and the calcium to be excreted from the body (41). In a study by Bolster et al (43), which they conducted with 5 trained male endurance athletes in 2005, the athletes were provided with low protein (LP-0,8g/kg), moderate protein (MP-1,8 g/kg), and high protein (HP-3,6 g/kg) in line with a 4-week-diet program. As the result of this study, the protein oxidation escalated with the increased protein intake. In the wake of the training, the Fractional Synthetic Rate (FSR) was found significantly higher than LP, and the MP was found to be higher than HP. In the study conducted by Garrow et al.(44), 3 weeks after a hypocaloric diet in obese cases, the nitrogen loss is significantly low in the diet containing 15% protein as opposed to that containing 10% protein. In addition to this, the low nitrogen, while the daily consumed protein was 5:1, was found significantly low, and the protein was preserved at a rate of 13 %. What is equally important is that the lowest nitrogen level develops in the consumption of the daily diet containing 10-15% protein at a ratio of 5:1. The daily protein requirement recommended according to the physical activity is shown in Table 2-8.

Table 2-8 The Daily Protein Requirement Recommended for Physical Activity

Physical Activity Level	g/kg/day	Content- info
Daily or General CHO Intake		
ISSN		
General Fitness	0.8-1.0 g/kg/ BW/day	Focus on quality protein Containing Amino acids All nutrients Proper reliable supplements as required.
Elder Individuals	1.0-1.2 g/kg/ BW/day	
Moderate amounts in heavy training programs	1.0-1.5 g/kg/ BW/day	
High Volume in heavy training programs	1.5-2.0	
IOC		
Low-intensive or body form-based activities	3-5 g/kg/ BW/day	
Average Exercise Program, ~1 hour/day	5-7 g/kg/ BW/day	Involves pre,during and post training intakes
Endurance program, Average-high intensive,1-3 hour/day	6-10 g/kg/ BW/day	Individual tolerance and preference
Athletes exercising strength	4-7 g/kg/ BW/day	Selection of nutritional density
Overload, moderate high intensive training ,>4-5 hours/day	8-12 g/kg/ BW/day	

The amount of protein to be taken in according to the type of sports is given in Table 2-9 (45, 46). ACSM recommends the moderate amount protein intake prior to training. There is no special guideline for the protein intake prior to training. ISSN suggests getting the protein along with the CARB depending on the individual characteristics and the duration and level of the exercise. Within 3-4 hours before training or competition/race, 0.15-0.25 g/kg BW protein should be taken in along with1-2 g/kg BW CARB (7).

ACSM finds the evidences regarding the additional benefits of CARB-protein solution intake during the exercise insufficient. There was no recommendation with respect to this subject during the consensuses made (18).

According to the recent studies of ISSN, CARB-protein supplements (CARB-protein 3-4:1) can be taken in throughout the exercise/training. In these studies, it has been pointed out that the endurance performance develops that muscle glycogen storages increase and that adaptation to exercise accelerates, as well, in the wake of resistance exercises. Still, the advisabilities of these energy supplements are unknown (7).

According to ACSM, the primary objective of the recommendations on protein intake after exercise/training is to provide the essential fluid, electrolyte, energy and CARB, build up the muscle glycogen storages and complete /fulfill the recovery. With the protein supplement, amino acids are obtained for the repairment and sustenance of the muscle proteins (18).

ISSN recommends the CARB-protein ratio as 3-4:1 for post training recovery. The types of amino acids recommended at consensuses are the essential amino acids. (EAA), which are active in the muscle protein synthesis. Within 3 hours following the training, 6-20 g EAA should be taken in for 30-40 g high glycemic CARB (7).

Table 2-9 The Amount of Protein to be taken in According to the Types of Sports

Type of Sport	Per Weight	Total
Body Building	1.4- 1.8 gram protein	105-135grams
Weight lifting +Powerlifting	1.2- 1.6gram	90-120grams
Boxing+kickboxing-Wrestling	1.2- 1.6gram	90-120grams
Swimming+Karate	1.2- 1.4gram	90-105grams
Basketball	1.2- 1.4gram	90-105grams
Football	1.0- 1.2 gram	75-90grams
Table Tennis	1.0- 1.2 gram	75-90grams

- **Fats**

Fats, as well as providing energy, also function as carriers in order to enable the fat-soluble/oil-soluble vitamins, A, D, E, K and caratenoids to be used in the body (47, 48). Fats are the source of antioxidants and numerous biological active components. They also function in the construction of the blocks, and play a key role as the regulator in a number of biological functionings (48).

Fats are composed of triglycerides made up of fatty acids and glycerole. Free fatty acids have biological effects in different fields, from modulating the clinical markers of disease risks to regulating several biological mechanisms that generate intracellular transmission and gene expression. Fatty acids modulate the physiological systems which influence the lipid metabolism, and the risk factors for chronic diseases. Whether or not these impacts that they pose on the health outcomes are beneficial or harmful depends on certain fatty acids and the mixture of fatty acids in the body and in diet. Free fatty acids already exist in nutrients. Different foods/nutrients are rich sources in terms of certain fatty acids (49).

Fatty acids are basically classified according to the chain length, degree of saturation (defined by the molecular double bond number) and the location of the first double bond, counted from the methyl end (48).

The classifications of fatty acids are shown in Table 2-10 (50):

Table 2-10 Classification of Lipids

FATTY ACIDS	
II- GLYCERIDES (glycerol-containing lipids)	**III-NONGLYCERIDE LIPIDS**
A-NEUTRAL FATS Mono-, di- and triglycerides Glycerin Ethers Glycosyl glycerides	A- SPHINGOLIPIDS Ceramides Sphingomyelins Glycosphingolipids
B- PHOSPHOGLYCERIDES Phosphatides Diphosphatidylglycerols and Phosphoinositides	B- ALIPHATIC ALCOHOLS and WAXES
	C- TERPENES
	D-STEROIDS
IV- LIPIDS LINKED TO OTHER CLASSES OF COMPONENTS	
A-LIPOPROTEINS B- PROTEOLİPİDS C- PHOSPHATIDE PEPTIDES D-LIPO-AMINO ACIDS E- LIPOPOLYSACCHARIDES	

The Dietary Guidelines Advisory Committee (DGAC) focus strongly on the subject of fats due to the fact that there are rich resources regarding the researches conducted on the different bonding types of fats for heart health and blood lipid values. The lipids and lipoproteins in the blood have historically attracted quite a lot of attention owing to their underlying biological functions in the progression and prevention of cardiovascular diseases (49).

Fats are particularly utilized as the energy source during prolonged exercises (prolonged aerobics). Despite the fact that carbohydrates have limited storage in the body,

every 0.5 kg of fat stored in the body provide an average of 3500 kcal. energy (47).

In athletes, the rate of maintaining energy from fats should be kept around 20-25%. The performance may be negatively influenced due to the reduction in the carbohydrate consumption through increasing fat consumption. Yet, in the studies conducted, fat intake below 15% is stated to have a negative impact on the performance and blood lipids (47).

The fat requirements of athletes are similar and quite higher and different from that of non-athletes. It is quite vital that an adequate amount of fat be consumed in providing optimal health and sustaining the energy balance, and in the optimal intake of essential fatty acids and fat-soluble vitamins.

The recommendation of ACSM on daily fat intake is 25-30% of the total energy requirement. Fat intake should not drop below 20% of the energy intake, because fat intake is quite important in terms of essential fatty acids and fat-soluble vitamins. Diets with a high-fat rate are not recommendable for athletes (7).

ISSN recommends that 30% of the total energy, for athletes, consist of fats. This percentage can rise up to 50% in the high intensity trainings, and in the 40 hours/ week trainings of elite competitors/racers. In the event of any reduction in the body fat rate or weight loss in the body, the fat intake can be recommended as 0,5-1,0 g/kg BW. Here, the point to be focused on is to increase the source of unsaturated or essential fatty acids within the diet (7). IOC's recommendation on this matter , on the other hand, is that supplying less than 15-20% of the total energy from fats is not expectable (7,18).

2.2.3 Liquids and Electrolytes

Depending on the number of muscles in the body, 55-70% of the body weight is composed of water. It is known that the athletes maintaining their fluid balance during the training reach an optimal exercise performance and that the progressive dehydration (reduction in the amount of body fluid) affects the performance in a negative way. Besides, dehydration in athletes increases the risks of life-threatening heat exhaustion and heat

stroke (51).

The primary symptom of hydration is the plasma or serum osmolality. According to the final IOM report published in 2004, it was informed in the 3rd National Health and Nutrition Examination Survey (NHANES III) that one- tenth of the total water intake enabled the serum osmolality. Thirst is the desire to drink water, giving both physiological and behavioral clues. Thirst is triggered by the reduction in the blood volume or severe dehydration, as the result of which water deficit develops in the body within a few hours (52).

According to NHANES III, the total fluid/liquid intake involves the drinking water, liquid foods and the water received through nutrients. The daily total fluid intake in young men and women aged between 19-30 should be between 2.7 Lt and 3,7 Lt (52).

The total fluid in the body is made up of two compartments as intracellular and extracellular. The extracellular fluid is also divided in two within itself as the interstitial fluid and plasma.

2/3 of the total body fluid, the rate of which is 600 ml in the body mass of about one kg, is found in the intracellular compartment (400 ml/kg), while 1/3 of it is found in the extracellular compartment (200 ml/kg).

Separately, 75% of the extracellular fluid (150 ml/kg) is found among the tissues, whereas 25% of it is found in plasma (50 ml/kg). That being said, it is crucial that the intracellular and extracellular fluid be balanced within the body in order for the survival functions of the body to be performed properly. This balance is provided by the intracellular potassium and the extracellular sodium and some minerals and proteins referred to as electrolytes. Electrolytes are the electrically-charged ions found in the body fluid. Ions play a role in the transmission of nerve conduction, muscle contraction and the occurrence of the stimulants necessary for the intracellular and extracellular flow of water and other agents (action potentials). Most of the normal body functioning depends on these

agents. Although vomiting causes an electrolyte loss on a significant level in the human body, the ways through which loss of electrolyte takes place are, in effect, the urinary tract, excrement and perspiration (53).

According to 2007 and 2009 ACSM Guidelines, the fluid electrolyte replacement in physical activity is shown in Table 2-11 (54).

Table 2-11 Fluid and Electrolyte Replacement in Physical Activity According to ACSM Guidelines

Pre Training/Exercise	Pre-hydration; should be received within a few hours before allowing for the fluid absorption and normal urination for the exercise. Beverages and liquids/fluids with sodium content increase the feeling of thirst and fluid retention.
During training/Exercise	The fluid program should be specified, before and after training, for each person according to their body sizes For athletes, less than 2% of losses which will occur in the body weight throughout the training are prevented. If fluids contain CARB and electrolyte, the maintenance of the fluid balance and exercise performance can be provided.
Post training/Exercise	Normal meals and beverages complement the fluid loss. If rapid recovery is required, 1.5 Lt of fluids per body weight should be added/supplemented throughout the training. Since Beverages and snacks contain sodium, they contribute to rapid recovery, the stimulation of the feeling of thirst and fluid retention.

According to IOC, the adequate fluid intake becoming almost less than 2% of the body mass during the exercise is known as dehydration. The sodium loss developing through perspiration is high, particularly during the exercises lasting for more than 2 hours (54).

Sweat losses, voluntary fluid intake and dehydration levels occurring in different types of sports are shown in Table 2-12.

Table 2-12 Sweat Losses, Voluntary Fluid Intake and Dehydration Levels Occurring in Different Types of Sports

		Sweat Loss L/Hour		Voluntary Fluid Intake L/Hour		Dehydration % Body Weight	
Sports	**Status**	**Average**	**Min.-Max**	**Average**	**Min.-Max**	**Average**	**Min.-Max**
Water Polo	Training. (Male)	0.29	0.23-0.35	0.14	0.09-0.20	0.26	0.19-0.34
	Competition (M)	0.79	0.69-0.88	0.38	0.30-0.47	0.35	0.23-0.46
Netball	Summer Training. (Female)	0.72	0.45-0.99	0.44	0.25-0.63	0.7	+0.3-1.7
	Summer Comp. (F)	0.98	0.45-1.49	0.52	0.33-0.71	0.9	0.1-1.9
Swimming	Training (M-F)	0.37		0.38		0	+1.0-1.4 kg
Rowing	Summer Tr. (M)	1.98	0.99-2.92	0.96	0.41-1.49	1.7	0.5-3.2
	Summer Tr. (F)	1.39	0.74-2.34	0.78	0.29-1.39	1.2	0-1.8
Basketball	Summer Training. (M)	1.37	0.9-1.84	0.80	0.35-1.25	1.0	0-2.0
	Summer Comp. (M)	1.6	1.23-1.97	1.08	0.46-1.70	0.9	0.2-1.6
Football	Summer Training. (M)	1.46	0.99-1.93	0.65	0.16-1.15	1.59	0.4-2.8
	Winter Training. (M)	1.13	0.71-1.77	0.28	0.03-0.63	1.62	0.87-2.55
Tennis	Summer Comp. (M)	1.6	0.62-2.58	1.1		1.3	+0.3-2.9
	Summer Comp. (M)		0.56-1.34	0.9		0.7	+0.9-2.3

Athletes should start their exercises/training with an adequate amount of fluid in their body. While 400-600 ml of fluid consumption is recommended 2-3 hours prior to the exercise/training, this application, as well as providing the optimal fluid balance prior to training, will allow for the necessary period of time for the athlete to eliminate / remove the excessive fluid through urination. At the beginning of the exercise / training and afterwards, the body fluid balance is maintained by consuming 150-350 ml of fluid at 15-20 minute-intervals (51).

Sports drinks/beverages are recommended for athletes owing to the fact that they replace the little amounts of carbohydrates and minerals the athlete loses through perspiration during the exercise. It is appropriate to have sports drinks during the competitions/races and trainings that last for an hour or more. It is advised that the sports drinks taken in during the exercise contain a 4-8% of carbohydrates (51).

2.2.4. Micronutrients

Vitamins and minerals are always the essential nutrients for health. The ergogenic effects of many micronutrients have not yet been thoroughly clarified (7).

Required to be taken in with a certain amount through a diet, vitamins are organic components of a high biological efficiency, which the cells and organs require for their normal functioning and for healthy growth. Since the body cannot make vitamins, except for some vitamins produced rather below the amount it requires, it is compulsory that vitamins be taken in from the outside sources. In the event that an adequate amount of vitamin cannot be received, disfunctioning in the cells and tissues occur, as the result of which health problems follow. Vitamins are taken into the body through fruit, and vegetative and animal products or vitamin- additive convenience foods (55).

The main / essential micronutrients in human diet are composed of 17 minerals and 13 vitamins, and they must be taken in through nutrients at proper amounts. Several non-essential micronutrients not involved in this group do not have to be taken in through the nutrients. However, when taken in extra, they are the organic phytochemicals helping one to be healthier. The first group of vitamins comprises the fat-soluble/oil-soluble ones (A, D, E, K), while the second group consists of water-soluble vitamins (B complex group and Vitamin C) (55).

95-96% of the human body, in terms of dry weight, is formed of organic elements (C, O, H ve N), whereas 4-5% of it is made up of minerals and trace elements (inorganic building blocks of the body). Among the basic sources of nutrients are water, proteins, fats,

glucose and vitamins as well as minerals and trace elements.

Just like the vitamins, minerals and trace elements also need to be daily taken in at very low amounts through the nutrients (56).

Mineral elements are naturally found in the soil. Humans receive their mineral and trace element requirements through the vegetables and fruit growing naturally in the soil or by eating the meat and other processed products of farm animals. Minerals and trace elements are divided into two main groups according to their levels in the body (in the tissue and organs) and the amounts necessary to be taken daily from outside. Those in the first group are termed as macroelements. The amounts of them necessary for the body are represented by a gram (g), while the amounts of microelements are represented by a milligram (mg). Whereas sodium (Na), potassium (K), calcium (Ca), phosphorus (P), magnesium (Mg), chlorine (Cl) and sulphur (S) are involved in the group of macroelements, iron (Fe), copper (Cu), zinc (Zn), cobalt (Co), manganese (Mn), molybdenum (Mo), chromium (Cr), selenium (Se) and iodine (I) are involved in the group of microelements (trace elements) (56).

Calcium and phosphorus are major macrominerals. The most commonly-found mineral in the body is calcium (Ca), the great amount of which is found in the bones. 40% of the total minerals in our body are formed by this mineral. The chief role of calcium is to function in bone and teeth formation. In several enzyme activities, it is an essential element for hormonal responses and blood clotting. Its functioning in the nerve impulse conduction and its role in the cell wall permeability are the other significant functions of calcium. It is found in cheese, milk and dairy products at considerable amounts. Calcium deficiency causes consequences, such as growth retardation and anomaly in bone formation (rachitism, osteoporosis). In its calcium phosphate compound, it constitutes the main structural ingredients of bone and teeth. There are a series of physiological activities arranged by throwing calcium into and out of the cell. (e.g. neural transmission and muscle contraction). Another intracellular function of calcium is that it acts as the ‘’ secondary messenger’’ for

the hormones and other molecule. (56).

Phosphorus (P) is also found at considerable amounts by comprising 25 % of the total mineral amount of our body.

Like calcium, this element has a major role in the bone and teeth formation. Separately, other significant functions of phosphorus are muscle formation, existing in the DNA and RNA structures, generating energy, phospholipid formation and being involved in carbohydrate and amino acid metabolism. The deficiency of phosphorus can be noticed through the symptoms of anorexia (loss of appetite), feebleness/weakness, bone pains and developmental disorders. It is rather a grain-based element (57).

In Table 2-13 and 14, the daily vitamin requirement according to the target group and the total energy level is shown (28).

Table 2-13 RDA Vitamin Requirement Table

Nutrient Groups/ Target Group(target population)		**VITAMIN A**	**VITAMIN E**	**VITAMIN C**	**THIAMIN**	**RIBOFLAVIN E**	**NIACIN**	**VITAMIN B_6**	**FOLATE**	**VITAMIN B_{12}**
		RDA	RDA	RDA	RDA	RDA	RDA	RDA	RDA	RDA
		(µg RAE)	**(mg AT)**	**(mg)**	**(mg)**	**(mg)**	**(mg)**	**(mg)**	**(µg)**	**(µg)**
1000	Kids 1-3	300	6	15	0.5	0.5	6	0.5	150	0.9
1200	Female 4-8	400	7	25	0.6	0.6	8	0.6	200	1.2
1400	Male 4-8	400	7	25	0.6	0.6	8	0.6	200	1.2
1600	Female 9-13	600	11	45	0.9	0.9	12	1	300	1.8
	Female 51-70. 70+	700	15	75	1.1	1.1	14	1.5	400	2.4
1800	Male 9-13	600	11	45	0.9	0.9	12	1	300	1.8
	Female 14-18	700	15	65	1	1	14	1.2	400	2.4
	Female 31-50	700	15	75	1.1	1.1	14	1.3	400	2.4

2000	Male 51-70. 70+	900	15	90	1.2	1.3	16	1.7	400	2.4
	Female 19-30	700	15	75	1.1	1.1	14	1.3	400	2.4
2200	Male 14-18	900	15	75	1.2	1.3	16	1.3	400	2.4
	Male 31-50	900	15	90	1.2	1.3	16	1.3	400	2.4
2400	Male 19-30	900	15	90	1.2	1.3	16	1.3	400	2.4
2600	Male 19-30	900	15	90	1.2	1.3	16	1.3	400	2.4
2800	Male 14-18	900	15	75	1.2	1.3	16	1.3	400	2.4
3000	Male 19-30	900	15	90	1.2	1.3	16	1.3	400	2.4
3200	Male 14-18	900	15	75	1.2	1.3	16	1.3	400	2.4

Table 2 -14 RDA Mineral Requirement Table

Nutrient Groups / Target group(target population)		**CALCIUM**	**PHOSPHORUS**	**MAGNESIUM**	**IRON**	**ZINC**	**COPPER**	**SODIUM**	**POTASSIUM**
		AI	**RDA**	**RDA**	**RDA**	**RDA**	**RDA**	**UL (2004)***	**AI (2004)**
		(mg)	**(mg)**	**(mg)**	**(mg)**	**(mg)**	**(µg)**	**(mg)**	**(mg)**
1000	Kids 1-3	500	460	80	7	3	340	<1500	3000
1200	Female 4-8	800	500	130	10	5	440	<1900	3800
1400	Male 4-8	800	500	130	10	5	440	<1900	3800
1600	Female 9-13	1300	1250	240	8	8	700	<2200	4500
	Female 51-70, 70+	1200	700	320	8	8	900	<2300	4700
1800	Male 9-13	1300	1250	240	8	8	700	<2200	4500
	Female 14-18	1300	1250	360	15	9	890	<2300	4700
	Female 31-50	1000	700	320	18	8	900	<2300	4700
2000	Male 51-70, 70+	1200	700	420	8	11	900	<2300	4700
	Female 19-30	1000	700	310	18	8	900	<2300	4700
2200	Male 14-18	1300	1250	410	11	11	890	<2300	4700
	Male 31-50	1000	700	420	8	11	900	<2300	4700
2400	Male 19-30	1000	700	400	8	11	900	<2300	4700
2600	Male 19-30	1000	700	400	8	11	900	<2300	4700
2800	Male 14-18	1300	1250	410	11	11	890	<2300	4700
3000	Male 19-30	1000	700	400	8	11	900	<2300	4700
3200	Male 14-18	1300	1250	410	11	11	890	<2300	4700

Vitamins are necessary for sports performance. However, it is still under discussion whether or not the excessive intake of vitamins will have a positive or negative effect on the performance. A balanced diet arranged according to the energy requirement involves various vitamins (58).

ACSM recommends that an athlete provide the adequate amount of energy through rich varieties of foods instead of an additional vitamin mineral supplement. Micronutrients are not associated with training performance (7).

According to ISSN, specific vitamins like Vitamin E, niacin, folic acid and Vitamin C have beneficial effects on health. In some articles, the ergogenic characteristics of vitamins are also directly reported. Some vitamins can enable the endurance of physically active individuals during the exercises and trainings, as the result of which the exercise/training performance improves. Moreover, Vitamin C and E support the immune system by minimizing the oxidative damage resulting from heavy training programs (8).

Koçyiğit et al. (58), in a study they conducted in 2011, during which they researched into the effects of loading Vitamin C to footballers and basketball players on blood iron (Fe++), total iron binding capacity (TIBC), glucose and insulin values in the wake of providing them with a 3-week-training and Vitamin C (vit C), suggested that loading Vit C increased Fe++ level and decreased TIBC.

Minerals are also essential nutrients.Some studies have also pointed out the mineral differences in athletes. They may affect the performance of athletes in a negative way. Studies regarding health and the ergogenic value of some minerals, such as calcium, have been performed (8).

Excess quantity of water-soluble vitamins is removed through the urinary system. However, excessive intake of fat-soluble/oil-soluble vitamins may cause major health problems, such as loss of appetite (anorexia), headache, liver injury, bone pain, neurological and renal problems (59).

Vitamin B group is associated with training/exercise for two basic reasons. Thiamin, riboflavine, Vitamin B6, niacin, pantothenic acid and biotin help generating energy during the exercise, while folic acid and B12 vitamins are essential for the formation of red blood cells, protein synthesis, tissue construction /tissue-making and repair.

Calcium functions in the bone and teeth development, blood clotting, nerve conduction, cardiac control and in the transport processes of the cell membrane. Hemoglobin, which contains iron, carries oxygen through the lungs to the muscles and other regions of the body. Oxygen is required for the muscles to generate energy. If the iron level in the blood is low, the athlete gets tired quickly. Iron deficiency is also known as anaemia. Some of the symptoms of iron deficiency are tiredness, headache and poor appetite (60).

Nutritional and Liquid Supplements for Athletes

ACSM recommends the proper use of ergogenic aids for athletes. Some products should be taken after being carefully evaluated in terms of their safety, efficiency, potential and legal aspects.

According to the views of ISSN (2010), it is reported that supplement intakes will be of use in athletic performance in the event that having them along with the diet is inadequate.

The reports concerned with this subject analyze the supplements in two categories as reliable/safe and efficient.

Apparently Efficient and Generally Safe: These supplements contain ceratin/keratin, protein, EAAs, low-calorie foods, ephedra, caffeine, water Carb-electrolyte solution, sodiumphosphate and bicarbonate and beta-alanine.

Possibly Effective Supplements: These comprise β-hydroxy β-methylbutyrate (HMB), amino acid chain, calcium, conjugated linoleic acid, and green tea extract.

Supplements Showing Early Effect: These are α-ketoglutarate, α-ketoisocaproate, ethisterone, peptides stimulating the growth hormone, ornithine alpha-ketoglutarate (OKG), zinc magnesium aspartate (ZMA), chitosan, phosphatidylcholine, betaine, coleus forskohlii, dehydroepiandrosterone (DHEA), psychotic foods or libs and medium-chain triglycerides.

Ineffective or Hazardous Supplements: The examples to these are glutamine, smilax, isoflavone, sulfo-polysaccharides, boron, chrome, CLA (conjugated linoleic acid), gamma oryzanol, prohormones, tribulus terrestris, vanadium, calcium pyruvate, chitosan, L-carnitine, phosphate, herbal diuretics, Ribose and iNOS (Inducible nitric oxide synthase).

According to IOC, regular/sustained supplements enhance the exercise performance. Evidences promoting this subject are as follows (61):

1. Alkalinizing agents (sodium bicarbonate and sodium citrate) elevate the anaerobic exercise performance.
2. L-arginine enables the aerobic endurance.
3. Beta-alanine improves the anaerobic and aerobic exercise performance.
4. Caffeine increases the period of endurance and reaction.
5. Ceratin/keratin increases the performance in cases requiring strength and power.
6. Nitrate improves the aerobic endurance exercise.
7. CARBs, proteins, water, electrolytes and amino acids are of ergogenic character.

IOC strongly emphasizes and promotes the use of supplements through distillation/purification.

Supplements and nutrients for athletes are also predominantly used by athletes on

different levels as well as non-athletes. In using those supplements, their additional advantages improving the body composition, performance and general health, and the rate of their useful-harmful effects must be analyzed with great care (61).

In a study conducted by Nelson et al. (62), the cardiovascular effect of energy drinks was examined, and the energy drink was suggested to have no effect on the balance of the parasympathetic and sympathetic systems.

2.3.Health and Nutrition for Swimmers

The most important factors affecting the performance of athletes are their genetic makeup, proper training and a balanced diet.

The performances of swimmers also depend on several factors as is in many of the other sports branches. For instance, the performance of a swimmer who is living in a hot climate and has always been used to do his/her trainings in an outdoor swimming pool can be lower in a competition/race which is held in a region where cold climate prevails and in indoor pools where the amount of oxygen is less found (63).

In general, the factors affecting the swimmers' performance are as follows:

2. Genetic Makeup
3. Age
4. Gender
5. Physical Condition
6. Nutritional Status
7. Climatic-weather conditions

8. Environmental Factors

9. The condition/state of the swimming pools

10. Psychological State

11. Social Environment

12. Other

Swimmers expend more energy when compared with those who are not involved in sports. The more the physical activity gets intense, the more energy they require. During training, an athlete's muscles contract and relax more forcefully, the pulse (heart rate) is rapid, the heart pumps blood into the body more rapidly, thus the respiration is quite fast, which means that the lungs also work faster (64).

While practicing swimming, 6 to 10 calories per minute are lost; hence, swimmers should get 300-500 calories/hour more. A swimmer's enery requirement, just as the other athletes is closely associated with the body size, composition, age, gender, energy expenditure during resting/relaxation, energy expenditure during training, thermogenesis and growth and development (63,64).

When a swimmer's 6-12 trainings for 3-4 days per week, 2000 m-10km running, 20/15 min.- anaerobic/aerobic exercises and the athlete selections are all considered, the energy calculation and the diet to be recommended requires a serious planning.

Swimming is an important endurance sport which is based on AEROBIC metabolisms and through which ANAEROBIC metabolisms also intensively become part of the activity. The basic source of energy in endurance sports is carbohydrates. In long-distance swimmers, on the other hand, fats are also used for energy.

Swimmers always have to make use of the efficient energy sources for a high performance. Under all conditions, the metabolism requires nutrients in order to obtain energy.

Table 2-15 Nutrition for Normal Individuals and Athletes

Nutrient	Normal individual	Athlete
Carbohydrate (1 g 4 kcal)	%50	%60
Protein (1 g 4 kcal)	%20	%20
Fat(1 g 9 kcal)	%30	%20

Competitive/race swimmers are those who need the most aerobic training despite the fact that they are compared with short-distance runners of races. Such a circumstance generally occurs during the first term of the swimming season when a swimmer builds up the basis of the competitive swimming style unique to her/him. Since the majority of the seasons of competition period will be rather long and challenging, both of the aerobic and anaerobic components necessary for swimming must be maximized. The energy expenditure of competitive swimmers is quite high due to the fact that they have to swim with high intensity for almost 4 hours per day, do weight workouts to be able to build up muscles a few times a week and maintain it, and that they need to be able to keep on with their daily activities. Swimmers require a good diet program unique to them, since their energy requirements are high and they need each of the nutritional elements.

Due to this high energy requirement of swimmers, it is advised that the carbohydrate requirement *per kg* of the body weight should be calculated instead of the carbohydrate percentage acquired from the total energy. For this reason, swimmers need to

maximize their glycogen storages by consuming regular meals and snacks containing adequate amounts of carbohydrates. High energy requirements and repeated daily trainings will rapidly drain the muscle and liver glycogen storages of an athlete. Muscle glycogen storages require to be filled up every 24 hours. In the wake of the sports, such as football, basketball and tennis, which last for 30-90 minutes, the refill of muscle glycogen storages must definitely be ensured. Muscle glycogen storages may also be used up after practising the sports like swimming, running, and cycling that last for 10-20 minutes (65).

The average energy requirement for swimmers is between 2500- 5000 calories. The energy requirement of each swimmer is different and should be calculated distinctively. The energy requirement of a swimmer varies according to his/her age, gender, frequency and intensity of training, physical form and several other factors.

The energy requirement of swimmers is calculated as follows:

Energy = Basal metabolic rate (BMR) + Thermal Effect of Nutrients+ Growth Factor + Energy required for physical activity.

ENERGY REQUIREMENT = BMR + FA + SDA

Basal Metabolic Rate (BMR):

Harris-Benedict formula

BMR (for Females) = 665 + (9,6 x Weight-kg) + (1,8 x Height-cm)- (4,7 x Age-year)

BMR (For Males) = 66 + (13,7 x Weight-kg) + (5 x Height-cm)- (6,8 x Age-year)

Thermal Effect of Nutrients (SDA) =Thermogenesis: It is usually calculated as 10 % of BMR.

Table 2-16 Energy Expenditure According to the Swimming Stroke / Style

(as: calorie /kg/min)

Butterfly	0.182
Backstroke	0.169
Breaststroke/frog-style kick	0.162
Freestyle Fast	0.156
Freestyle Slow	0.127

Table 2-17 Daily Energy Expenditure in Swimming (Calorie/day for a female swimmer)

Age	Non-athlete	Swimmer	Hour
10 altı	2400	2800-2900	1
11-14	2200	3000-3400	2
15-18	2100	3700-4900	4
19-22	2100	3700-4900	4
23-50	2100	3600-4400	4

Table 2-18 Daily Energy Expenditure in Swimming (Calorie/day for a male swimmer)

Age	Non-athlete	Swimmer	Hour
10 altı	2400	2800-2900	1
11-14	2700	3700-4100	2
15-18	2800	4800-6000	4
19-22	2900	4900-6100	4
23-50	2700	4700-5500	4

Another energy calculating method for swimmers is to calculate the energy requirement per kg. According to the intensity of the training, a swimmer requires 40-50 kilocalorie (kcal) energy per his/her kg. For example; a swimmer weighing 70 kg requires 2800-3500 kilocalories (kcal) of energy. Depending on the intensity of the activity, the swimmer's diet program should be arranged by calculating the lowest and the highest energy.

Athletes /those involved in sports should provide an average of 50-60% of their daily energy through CHOs (CARBs). On the other hand, in endurance sports or during the period when such exercises are performed, 60-70% of the energy must be obtained from CHOs. In other words, while 4.5 CHO consumption per kg of the body weight is adequate for normal people (300-350gr/day), it shows an increase up to 8.5-12.3 g in athletes (550-800gr/day). At most 15% of the energy provided by CHOs, on the other hand, should consist of glucides (66).

A competition which is the indicator of the practices that have been performed is of

great importance for an athlete /swimmer. It should also be kept in mind that nutrition alone is not the “magic formula” that will lead the athlete to success.

Ther types of nutrients to be selected within the final week are of significance, particularly in endurance sports (marathon, skiing, cross, cycling) and weightlifting sports (wrestling, boxing, weight lifting).

Carbohydrate-Loading Program

Until recently, instead of the CHO-loading program practiced in two stages as offloading/discharging and loading/charging, a different program through which the same result is achieved is practiced.

Purpose: Providing more saturation in the glycogen storages.

Sports Branches: Endurance and Team Sports.

Advantage: Prolonged training, delaying tiredness.

Way/ Mode of Application: 50 % of the daily energy intake consists of carbohydrates for the first 3 days of the competition week; on the other hand, the carbohydrate consumption is raised to 70% 3 days before the competition.

Advantages of Carbohydrate-Loading Program

1-Throughout the competition, there is a delay in the discharge/exhaustion of glycogen storages.

2-Full glycogen storages in the liver reduce the risk of hypoglycemia.

3-Oxygen expenditure is less when carbohydrates are used as energy.

How Should A Post Event (Post Competition) Meal Be?

The primary points to be taken into consideration in this type of meal are as follows:

1- The content of the meal eaten/had.
2- The time of the meal had.
3- The amount and type of beverages.
4- The meal should be psychologically satisfying.

The energy to be generated/provided by the last meal should exceed 500-800 calories.

Fillin up the muscle glycogen storages in the bodies of athletes performing regular training can take a period of 1-2 days. During this period, potassium-rich nutrients should be frequently given. While potassium can be provided through all the vegetables and fruits, the richest sources of potassium are potatoes, oranges and bananas. In endurance sports, one of the most important factors in terms of nutrition is the daily fluid intake. Adequate amounts of fluid and minerals should be received for the body. Fluid intake during the competition is significant in terms of replacing the fluid disposed of the body through perspiration. In a dehaydrated body, problems like cramps, fatigue, difficulty in breathing and slowing down in muscle functioning are observed. 5-10 levels of water, such as 2-2.5 glasses of water in the last meal and 1/2 or 1 glass of water 30 minutes before the competition is the best drink of all. Having said that, until one hour before training, ready CHO-solutions can be drunk in the way that they will provide 1-2 g carbohydrates per kg of the body weight (66).

3. MATERIAL AND METHOD

3.1. Objective

In this study, it was aimed that the nutritional statuses of junior and pubescent swimmers receiving nutrition consultancy and the changes in their body compositions in the wake of the consultancy be analyzed by using the "Athlete/Swimmer Data Form" and body analysis results (Appendix 1).

The "Athlete Data Form" consists of 6 sections and 37 questions in which the *information* regarding the athletes' age, gender, height, weight, Body Mass Index (BMI), and the branch and type of sport they are involved in, nutritional habits, fluid consumption, cooking manners, nutritional behaviors, their targets for a healthy diet, their body weight, physical activity status and medical history *is questioned.*

These sections are as follows:

1. Personal Information

2. Nutritional Habits and Fluid Consumption

3. Cooking Methods and Nutritional Behaviors

4. Targets and Body Weight History

5. Physical Activity Status

6. Medical History

Separately, each individual receiving consultancy on nutrition was measured / evaluated by means of JAVON-VENUS 5.5 Body Composition Analyzer. The analysis results performed through the bioelectrical impedance analysis method (BIA) will be evaluated to see the difference in the body composition between the first and the last interviews.

3.2. Material

This is a retrospective study in which those who applied to the Dietician/Nutritionist, Aysen Arıcan between 2007-2012 (in a 5-year-period) and filled out the '' Athlete Data Form'' will be analyzed; also this is the study in which the nutritional statuses of junior and pubescent swimmers receiving nutrition consultancy and the changes in their body compositions in the wake of the consultancy will be examined and analyzed along with their knowledge and behaviours on the matter, their demographic data, targets, body weight, physical activity status and medical history.

3.3.Tools and Materials

Appendix 1. Athlete Data Form

Data Collecting Forms/Methods and Devices:

The "Athlete Data Form'' consists of 6 sections and 37 questions in which the information regarding the athletes' age, gender, height, weight, Body Mass Index (BMI), and the branch and type of sport they are involved in, nutritional habits, fluid consumption, cooking manners, nutritional behaviors, their targets for a healthy diet, their body weight, physical activity status and medical history is questioned. These sections are: 1. Personal Information, 2.Nutritional Habits and Fluid Consumption, 3.Cooking Methods and Nutritional Behaviors, 4.Targets and Body Weight History, 5. Physical Activity Status, 6.Medical History

The physical structure of the body (Body build) is influenced by three main

components, such as muscle mass, height and weight. The body structure of each athlete is determined by these three components. Determining/Identifying the body composition, besides height and weight, provides additional information for the sports trainer/coach and the athlete.

3.3.1. Anthropometric Measurements of Swimmers

Body Fat Difference and Fat Percentage: The ideal body composition varies in different sports branches. However, the principle of less fat and better performance basically prevails. A high fat rate/percentage in the body may give rise to a decrease in strength, agility, speed and flexibility as well as the energy loss. Body weight can influence the speed, endurance and strength/power of athletes, whereas body composition can affect the strength, appearance and agility of athletes (67).

Body Fat Percentage: ([4,57/body density]-4,142)*100

Table 3-1 Body Fat Percentage Values for Males (68)

	20-29	**30-39**	**40-49**	**50-59**	**60+**
Very Low	<11	<12	<14	<15	<16
Low	11-13	12-14	14-16	15-17	16-18
Optimal	14-20	15-21	17-23	18-24	19-25
A little High	21-23	22-24	24-26	25-27	26-28
High	>23	>24	>26	>27	>28

Table 3-2 Body Fat Percentage Values for Females (68)

	20-29	**30-39**	**40-49**	**50-59**	**60+**
Very Low	<16	<17	<18	<19	<20
Low	16-19	17-20	18-21	19-22	20-23
Optimal	20-28	21-29	22-30	23-31	24-32
A little High	29-31	30-32	31-33	32-33	33-35
High	>31	>32	>33	>34	>35

Table 3-3 Body Fat Percentages Recommended for Male and Female Athletes in Various Sports Branches (69)

Sports Branch	**Males**	**Females**
Baseball	8-14	12-18
Basketball	6-12	10-16
Body Building	5-8	6-12
Football	10-16	-
Golf	5-12	12-20
Swimming	6-12	8-16
Wrestling	15-16	10-18

There are various methods to measure the body fat.

1-Skinfold method

2- Hydrostatic (Underwater) Weighing

3-Measuring the electrical impedance in tissues

Hydrostatic Weighing determines the body fat accurately. However, it necessitates the calculation of the volume of the lungs, which, in this sense, is not practical (69).

Skinfold method is more practical since acquiring it is easy and inexpensive.

While the fat percentage is being calculated by means of these tools, the layers on certain parts of the body are tightened, and thickness is measured. This measured/assessed value is compared with the standards determined beforehand, and the fat percentage is identified (69).

Basal Metabolic Rate (BMR): Basal Metabolic Rate is calculated in this way:

Table 3-4 The Calculation of Basal Metabolic Rate (BMR)

BMR in Females	655 + (9.6 x weight kg) + (1.8 x height cm) - (4.7 x age)
BMR in Males	66 + (13.7 x weight kg) + (5 x height cm) - (6.8 x age)

Table 3-5 BMR Values

Category	Value
Slim/Thin	18.4 and below
Normal	18.5-24.9
Overweight	25.0-29.9
Fat (Obese) - I. Class	30.0-34.9
Fat (Obese) - II. Class	35.0-44.9:
Very fat (Over-obese) - III. Class	45.0 and above

Body Mass Index (BMI): This is the measurement comparing the weight and height of an individual. In fact, it does not mean measuring the body fat percentage. It is only used for estimating a person's healthy body weight based on his/her height.

Formula: Weight / (Body Height)^2

Table 3-6 Body Mass Index (BMI) Values

BMI	BMI Percentile	Status
< 18.5	< 5th	Slim
Between 18.5-24.9	Between 5th – 85th	Normal
Between 25-29.9	Between 85th – <95th	Overweight
30 or above	> 95th	Obese

3.4. The Evaluation of the Data

The data were analyzed by using the SPSS 18.0 package program for Windows. The Student T test for the independent variables was performed by using the variance analysis (ANOVA). The fact that the p *value* proved to be ≤0.05 in the groups was regarded as significant.

4.FINDINGS

4.1.Personal Information

54,76% of 168 swimmers who had received nutrition consultancy between 2007-2012 (in 5-year-period) were male and 45,24% of them were female (See: Table 4-1).

Considering the age distribution of swimmers according to gender, 18.2% of the males were at the age of 11 and 18.2% were 13, whereas 23.3% of the females were at the age of 13 (See: Table 4-3).

Table 4-1 Gender Distribution of Swimmers

	number	%
FEMALE	92	54,76%
MALE	76	45,24%
TOTAL	168	100,00%

Table 4-2 Age (Year) Distribution of Swimmers According to Gender

	MALE	FEMALE	TOTAL
AVERAGE	12,67	12,69	12,83
SD	2,51	1,80	2,286
MİN	7	9	7
MAX	17	17	17

Table 4-3 Age (Year) Distribution of Swimmers According to Gender

AGE(Year		7	8	9	10	11	12	13	14	15	16	17	Toplam	Chi Square
														p
GENDER	MALE	2	1	6	5	14	7	14	12	5	2	9	77	14,69
		2.6%	1.3%	7.8%	6.5%	18.2%	9.1%	18.2%	15.6%	6.5%	2.6%	11.7%	100.0%	0,144
	FEMALE			2	10	12	16	21	16	8	2	3	90	
				2.2%	11.1%	13.3%	17.7%	23.3%	17.7%	8.8%	2.2%	3.3%	100.0%	
TOTAL		2	1	8	15	26	23	35	28	13	4	9	167	
		1,2%	0.6%	4.8%	9.0%	15.6%	13.8%	21.0%	16.8%	7.8%	2.4%	5.4%	100.0%	

4.2. FLUID CONSUMPTION

The fluid consumption of the swimmers, when examined, is 2034.11 ml per person on the average. It was found that the male swimmers consumed 2039.74 ml / person on the average, while the female ones consumed 2029.46 ml/ person on the average. The rate of water-drinking is around 50%. The rate of the consumption of sports drinks, on the other hand, is about 16% (See: Table 4-4 and Table 4-5).

Table 4-4 The Distribution of Fluid Consumption of Swimmers (on the basis of glass-bottle)

	Milk Glass	Mineral Water/ Soda-Glass	Turkish Coffee	Other Coffee	Other Fluid	Ready Fruit Juice	Sports Drink-bottle	Fresh-squeezed fruit juice	Tea glass	Water Lt	Total Fluid
Male	76	76	3	2	24	76	76	29	76	76	514
	14,8%	14,8%	0,6%	0,4%	4,7%	14,8%	14,8%	5,6%	14,8%	14,8 %	100,0%
Female	92	92	0	4	18	92	92	39	92	92	613
	15,0%	15,0%	0,0%	0,7%	2,9%	15,0%	15,0%	6,4%	15,0%	15,0 %	100,0%
Total	168	168	3	6	42	168	168	68	168	168	1127
	14,9%	14,9%	0,3%	0,5%	3,7%	14,9%	14,9%	6,0%	14,9%	14,9 %	100,0%

Table 4-5 The Distribution of Fluid Consumption of Swimmers (on the basis of ml)

	Milk ml	Mineral Water ml	Turkish Coffee ml	Other Coffee ml	Other Fluid ml	Ready Fruit Juice ml	Sports Drink ml	Fresh-squeezed fruit juice ml	Tea-Glass ml	Water ml	Total ml
MALE	11.400	11.400	90	300	3.600	11.400	25.080	4.350	11.400	76.000	155.020
	7,4%	7,4%	0,1%	0,2%	2,3%	7,4%	16,2%	2,8%	7,4%	49,0%	100,0%
FEMALE	13.800	13.800	0	600	2.700	13.800	30.360	5.850	13.800	92.000	186.710
	7,4%	7,4%	0,0%	0,3%	1,4%	7,4%	16,3%	3,1%	7,4%	49,3%	100,0%
Total	25.200	25.200	90	900	6.300	25.200	55.440	10.200	25.200	168.000	341.730
	7,4%	7,4%	0,0%	0,3%	1,8%	7,4%	16,2%	3,0%	7,4%	49,2%	100,0%

4.3. TARGETS

Considering the distribution according to the swimmers' targets, it was found that 39,1% of them responded with an increase in their general performance, while 36,1% of them developed muscle strength and 19% of them experienced weight loss (See: Table 4-6).

Table 4-6 Targets

	To Gain Weight	To lose Weight	To enhance performance	To strengthen muscles	Total
MALE	14	27	64	63	168
	8,3%	16,1%	38,1%	37,5%	100,0%
FEMALE	7	43	80	70	200
	3,5%	21,5%	40,0%	35,0%	100,0%
Total	21	70	144	133	368
	5,7%	19,0%	39,1%	36,1%	100,0%

4.4. BODY WEIGHT (BW) HISTORY& PHYSICAL ACTIVITY STATUS

80,1% of the swimmers have no diet history. 84% of those on a diet performed it with the help of a dietician (See: Table 4-7).

Table 4-7 The Distribution of the Diet History of Swimmers

	Yes	No	Total	Chi Square p
MALE	13	56	69	0,977
	18,8%	81,2%	100,0%	0,614
FEMALE	18	69	87	
	20,7%	79,3%	100,0%	
Total	31	125	156	
	19,9%	80,1%	100,0%	

72.1% of the swimmers stated that they ate meal before their training. 19.8% of them were found to have had fruit/bananas, 13% of them had the main course, while 11.5% of them had toasts (See: Table 4-8 and 4-9).

Table 4-8 The Distribution of Pre-Training Nutrition/Diet of Swimmers

	Yes	No	Sometimes	Rarely	**Total**
MALE	38	14	1	1	54
	70,4%	25,9%	1,9%	1,9%	100,0%
FEMALE	50	18	0	0	68
	73,5%	26,5%	,0%	,0%	100,0%
Total	88	32	1	1	122
	72,1%	26,2%	,8%	,8%	100,0%

Table 4-9 The Distribution of Pre-Training Nutrition/Diet of Swimmers

	Main Course	Molasses	Royal Jelly	Toast	Linden Tes (with honey)	Milk	Bananas/Fruit	Mandarin	Protein-Energy Nutrients	Sandwich	Cake*Biscuits, Cookies	Chocolate	Apple	Macaroni	Fruit Juice	Dried Nuts&Fruits	Total	
MALE	8	1	1	6	1	3	9	1	6	6		4	2	2	3	2	2	57
	14.0%	1.8%	1.8%	10.5%	1.8%	5.3%	15.8%	1.8%	10.5%	10.5%		7.0%	3.5%	3.5%	5.3%	3.5%	3.5%	100.0%
FEMALE	9	3		9		2	17	1	7	8		3	4	2	1	3	7	76
	11.8%	3.9%	.0%	11.8%	.0%	2.6%	22.4%	1.3%	9.2%	10.5%		3.9%	5.3%	2.6%	1.3%	3.9%	9.2%	100.0%
Total	17	4		15		5	26	2	13	14		7	6	4	4	5	9	131
	13.0%	3.1%	.0%	11.5%	.0%	3.8%	19.8%	1.5%	9.9%	10.7%		5.3%	4.6%	3.1%	3.1%	3.8%	6.9%	100.0%

89.2% of the swimmers have post-training meals. It was found out that 27.1% of them had bananas/fruit, 19.4% of them had the main course and 16.1% of them had milk in the wake of their training (See: Table 4-10 and Table 4-11).

Table 4-10 The Distribution of Post-Training Nutrition of Swimmers

	Yes	No	**Total**
MALE	48	5	53
	90.6%	9.4%	100.0%
FEMALE	59	8	67
	88.1%	11.9%	100.0%
Total	107	13	120
	89.2%	10.8%	100.0%

Table 4-11The Distribution of Post-Training Nutrition of Swimmers

	Main Course	Macaroni	Banana/ fruit	Mandarin	Toast	Milk	Dried Nuts and Fruit	Protei Energy ıtrients	Sandwich	Fruit	Cake	Fruit uice	Tatlı	Apple	Total
MALE	14	2	16	1	5	9		7	6	2	1	3		3	69
	20,3%	2,9%	23,2%	1,4%	7,2%	13,0%	,0%	10,1%	8,7%	2,9%	1,4%	4,3%	,0%	4,3%	100,0%
FEMALE	16	1	26		5	16	2	8	5	2	1	3	1	1	87
	18,4%	1,1%	29,9%	,0%	5,7%	18,4%	2,3%	9,2%	5,7%	2,3%	1,1%	3,4%	1,1%	1,1%	100,0%
Total	30	3	42		10	25	2	15	11	4	2	6	1	4	155
	19,4%	1,9%	27,1%	,0%	6,5%	16,1%	1,3%	9,7%	7,1%	2,6%	1,3%	3,9%	,6%	2,6%	100,0%

4.12. MEASUREMENT RESULTS

Considering the number of visits to the dietician which were made by the swimmers, it is seen that 21.8% of them had visited the dietician once, whereas 21.8% of them visited the dietician twice and 14,1% went to the dietician three times (See: Table 4-12).

In this study, since the measurement differences of those visiting the dietician once before and after training cannot be calculated along with the measurement averages, they have not been included in the calculations. According to this classification, it is seen that the number of those who visited the dietician 2-4 times was 79 (59.4%), and the number of those who went there 5-8 times was 36 (27.1%), while the number of those who went to the dietician 9 times and more was 18 (13.5%) (See: Table 4-13).

Table 4-12 The frequency of the visits made to the dietician by the swimmers

Frequency of Visits	n	%
Once	37	21.8%
Twice	37	21.8%
3 times	24	14.1%
4 times	18	10.6%
5 times	11	6.5%
6 times	14	8.2%
7 times	6	3.5%
8 times	5	2.9%
9 times	5	2.9%
11 times	4	2.4%
12 times	1	0.6%
13 times	2	1.2%
16 times	1	0.6%
17 times	2	1.2%
19 times	1	0.6%
21 times	1	0.6%
29 times	1	0.6%
Total	168	100.0%

Table 4-13 The classified Table of the number of visits made to the dietician by the swimmers

Number of visits to the dietician	n	%
Those visiting the dietician 2-4 times	79	%59.4
Those visiting the dietician 5-8 times	36	%27.1
Those visiting the dietician 9 times and more	18	%13.5
Total	133	%100.0

Considering the distribution of the differences between the measurement averages of the first/initial and last visits to the dietician according to the swimmers' genders, the differences among the measurements of weight, fat percentage, muscles, fluid, fluid percentage, BMR, BMI and WHR between the first and final visit measurement averages were found to be significant (See: Table 4-14).

Table 4-14 The Distribution of the Differences Between the Measurement Averages in the First/Initial and Final Visits of the Swimmers to the Dietician According to Their Gender

	Gender	n	Average	STD	t	p
The first/initial measurement of height (cm)	Male	59	160.3	14.9	1.556	.122
	Female	74	156.8	10.7		
The first measurement of Weight (kg)	Male	59	55.6	15.8	2.605	0.010
	Female	74	49.6	10.7		
The first measurement of Fat	Male	59	9.6	6.1	-1.214	0.227
	Female	74	10.7	4.5		
The first measurement of Fat Percentage	Male	57	15.9	6.8	-4.071	0.000
	Female	74	20.8	5.3		
The first measurement of muscles	Male	59	42.8	9.9	4.670	0.000
	Female	74	36.2	6.2		
The first measurement of Body Fluid	Male	59	33.1	7.8	4.529	0.000
	Female	74	28.1	4.9		
The first measurement of Body Fluid Percentage	Male	59	60.5	5.0	4.188	0.000
	Female	74	57.0	3.8		
The first measurement of BMR	Male	59	1421.5	209.1	6.172	0.000
	Female	74	1258.2	80.5		
The first measurement of BMI	Male	59	21.1	3.2	2.229	0.028
	Female	74	20.0	2.5		
The first measurement of WHR	Male	59	0.7	0.1	3.295	0.001
	Female	74	0.7	0.1		
The final measurement of height (cm)	Male	54	162.3	14.5	1.474	0.143
	Female	72	159.2	9.5		
The final measurement of Weight (kg)	Male	59	57.1	14.7	2.811	0.006
	Female	74	51.1	10.0		
The final measurement of Fat	Male	59	9.4	5.4	-1.799	0.074
	Female	74	10.9	4.1		
The final measurement of Fat Percentage	Male	57	15.5	6.2	-3.899	0.000
	Female	74	20.6	4.5		
The final measurement of Muscles	Male	59	44.4	9.6	5.294	0.000
	Female	74	37.2	5.9		
The final measurement of Body Fluid	Male	59	34.3	7.5	5.069	0.000
	Female	74	29.0	4.5		
The final measurement of Body Fluid percentage	Male	59	61.4	6.5	4.004	0.000
	Female	74	57.1	3.2		

The final measurement of BMR	Male	59	1454.8	199.0	7.269	0.000
	Female	74	1272.9	73.8		
The final measurement of BMI	Male	59	21.1	2.8	2.114	0.036
	Female	74	20.1	2.3		
The final measurement of WHR	Male	59	0.7	0.1	3.606	0.000
	Female	74	0.7	0.0		

Considering the distribution of the differences between the measurement averages of the swimmers' first and final visits to the dietician, the differences among the averages of height, weight, muscle, body fluid and BMR measurements are significant. In these measurements is the significance towards the final measurement. Nutrition consultancy can be said to have developed in line with its contribution to the body measurements of the athletes and the sports performed by them (See: Table 4-15).

Table 4-15 The Distribution of The Differences Between the Measurement Averages in the First and Final Visits of The Swimmers to The Dietician

	n	Average	STD	t	p
The first measurement of Height (cm)	126	157.9	12.8	7.906	0.000
The final measurement of height (cm)	126	160.5	12.0		
The first measurement of weight (kg)	133	52.3	13.5	5.020	0.000
The final measurement of weight (kg)	133	53.8	12.6		
The first measurement of Fat	133	10.2	5.3	.269	0.789
The final measurement of Fat	133	10.3	4.8		
The first measurement of fat percentage	129	18.6	6.5	1.816	0.072
The final measurement of fat percentage	129	18.3	5.9		
The first measurement of muscles	133	39.1	8.7	6.481	0.000
The final measurement of muscles	133	40.4	8.5		
The first measurement of body fluid	133	30.3	6.8	7.463	0.000
The final measurement of body fluid	133	31.4	6.5		
The first measurement of body fluid percentage	133	58.6	4.7	1.678	0.096
The final measurement of body fluid percentage	133	59.0	5.4		
The first measurement of BMR	133	1330.7	171.5	6.896	.000
The final measurement of BMR	133	1353.6	169.2		
The first measurement of BMI	133	20.5	2.9	0.383	.702

The final measurement of BMI	133	20.5	2.6		
The first measurement of WHR	133	0.7	0.1	0.537	0.592
The final measurement of WHR	133	0.7	0.1		

Considering the distribution of the differences between the measurement averages in the first and final visits of the male swimmers to the dietician, the differences among the averages of height, weight, muscle, body fluid and BMR measurements are significant (See: Table 4-16).

Table 4-16 The Distribution of the Differences Between the Measurement Averages in the First and Final Visits of the Male Swimmers to the Dietician

	n	Average	STD	t	p
The first measurement of height(cm)	54.0	159.2	15.1	-5.672	0.000
The final measurement of height(cm)	54.0	162.3	14.5		
The first measurement of weight (kg)	59.0	55.6	15.8	-3.033	0.004
The final measurement of weight (kg)	59.0	57.1	14.7		
The first measurement of fat	59.0	9.6	6.1	0.577	0.566
The final measurement of fat	59.0	9.4	5.4		
The first measurement of fat percentage	55.0	15.9	6.8	0.574	0.568
The final measurement of fat percentage	55.0	15.5	6.2		
The first measurement of muscles	59.0	42.8	9.9	-5.300	0.000
The final measurement of fat percentage	59.0	44.4	9.6		
The first measurement of body fluid	59.0	33.1	7.8	-5.188	0.000
The final measurement of body fluid	59.0	34.3	7.5		
The first measurement of body fluid percentage	59.0	60.5	5.0	-1.000	0.321
The final measurement of body fluid percentage	59.0	61.4	6.5		
The first measurement of BMR	59.0	1421.5	209.1	-5.144	0.000
The final measurement of BMR	59.0	1454.8	199.0		
The first measurement of BMI	59.0	21.1	3.2	.430	0.669
The final measurement of BMI	59.0	21.1	2.8		
The first measurement of WHR	59.0	0.7	0.1	-.497	0.621
The final measurement of WHR	59.0	0.7	0.1		

Considering the distribution of the differences between the measurement averages in the first and final visits of the female swimmers to the dietician, , the differences among the averages of height, weight, muscle, body fluid and BMR measurements are significant. In these measurements is the significance towards the final measurement. Nutrition consultancy can be said to have developed in line with its contribution to the body measurements of the athletes and the sports performed by them (See: Table 4-17).

Table 4-17 The Distribution of the Differences between the Measurement Averages in the First and Final Visits of the Female Swimmers to the Dietician

	n	Average	STD	t	p
The first measurement of height(cm)	72	156.9	10.8	-5.531	0.000
The final measurement of height(cm	72	159.2	9.6		
The first measurement of weight (kg)	74	49.6	10.7	-4.105	0.000
The final measurement of weight (kg)	74	51.1	10.0		
The first measurement of fat	74	10.7	4.5	-1.068	0.289
The final measurement of fat	74	10.9	4.1		
The first measurement of fat percentage	74	20.8	5.3	1.979	0.052
The final measurement of fat percentage	74	20.6	4.5		
The first measurement of muscles	74	36.2	6.2	-3.963	0.000
The final measurement of muscles	74	37.2	5.9		
The first measurement of body fluid	74	28.1	4.9	-5.401	0.000
The final measurement of body fluid	74	29.0	4.5		
The first measurement of body fluid percentage	74	57.0	3.8	-1.521	0.133
The final measurement of body fluid percentage	74	57.1	3.2		
The first measurement of BMR	74	1258.2	80.6	-5.439	0.000
The final measurement of BMR	74	1272.9	73.8		
The first measurement of BMI	74	20.0	2.5	-.907	0.368
The final measurement of BMI	74	20.1	2.3		
The first measurement of WHR	74	0.7	0.05	-.257	0.798
The final measurement of WHR	74	0.7	0.05		

Considering the distribution of the differences between the measurement averages in the first and final visits of the swimmers to the dietician according to the frequency of the visits made, the differences among the measurement averages of those visiting the dietician 2- 4 times, those visiting the dietician 5-8 times and those going to the dietician 9 times and more were found to be insignificant (See: Table 4-18).

Table 4-18 The Distribution of the Differences between the Measurement Averages in the First and Final visits of the swimmers to the dietician according to the frequency of the visits made

		n	Average	STD	Minimum	Maximum	F	p		n	Average	STD	Minimum	Maximum	F	p
The first measurement of height (cm)	Those visiting the dietician 2-4 times	79	158.9	12.6	130.3	188.0	1.534	.220	The final measurement of height (cm)	73	160.5	11.7	1.4	138.3	1.299	.276
	Those visiting the dietician 5-8 times	36	159.5	11.6	134.7	183.0				36	162.4	11.0	1.8	140.0		
	Those visiting the dietician 9 times and more	18	153.5	15.5	133.6	181.5				17	156.8	14.5	3.5	137.9		
	Total	133	158.4	12.8	130.3	188.0				126	160.5	12.0	1.1	137.9		
The first measurement of weight (kg)	Those visiting the dietician 2-4 times	79	53.0	13.5	26.0	92.0	0.496	0.610	The final measurement of weight (kg)	79	54.4	12.3	1.4	33.9	1.104	.335
	Those visiting the dietician 5-8 times	36	52.0	12.3	33.1	79.1				36	54.3	12.4	2.1	35.9		
	Those visiting the dietician 9 times and more	18	49.5	15.8	27.7	81.7				18	49.7	14.5	3.4	29.3		
	Total	133	52.3	13.5	26.0	92.0				133	53.8	12.6	1.1	29.3		
The first measurement of fat	Those visiting the dietician 2-4 times	79	10.1	5.2	1.3	25.9	0.165	0.848	The final measurement of fat	79	10.2	4.7	0.5	1.4	.061	.941
	Those visiting the dietician 5-8 times	36	10.1	4.8	1.3	21.4				36	10.4	4.7	0.8	2.6		
	Those visiting the dietician 9 times and more	18	10.9	6.3	1.9	27.2				18	9.9	5.6	1.3	1.4		
	Total	133	10.2	5.3	1.3	27.2				133	10.3	4.8	0.4	1.4		
The first measurement of	Those visiting the dietician 2-4	78	18.4	6.1	0.1	0.3	0.346	0.708	The final measuremen	78	18.3	5.9	0.0	0.1	.135	.874

fat percentage	times								t of fat percentage						
	Those visiting the dietician 5-8 times	35	18.4	7.7	0.1	0.3				36	18.1	6.3	0.0	0.1	
	Those visiting the dietician 9 times and more	18	20.0	7.5	0.1	0.4				17	18.6	6.1	0.0	0.1	
	Total	131	19.6	7.3	0.1	0.4				131	18.2	6.1	0.0	0.1	
The first measurement of muscles	Those visiting the dietician 2-4 times	79	39.8	8.8	21.0	60.8				79	41.0	8.3	0.9	25.6	
	Those visiting the dietician 5-8 times	36	39.0	7.9	24.2	56.3	1.192	0.307	The final measurement of muscles	36	40.4	8.5	1.4	25.6	1.354 .262
	Those visiting the dietician 9 times and more	18	36.3	9.6	24.2	57.3				18	37.4	9.2	2.2	26.0	
	Total	133	39.1	8.7	21.0	60.8				133	40.4	8.5	0.7	25.6	
The first measurement of body fluid	Those visiting the dietician 2-4 times	79	30.9	6.9	16.2	47.6				79	31.8	6.5	0.7	19.9	
	Those visiting the dietician 5-8 times	36	30.2	6.2	18.8	43.8	1.122	0.329	The final measurement of body fluid	36	31.6	6.3	1.1	20.9	1.382 .255
	Those visiting the dietician 9 times and more	18	28.2	7.5	18.6	44.6				18	29.0	7.1	1.7	20.2	
	Total	133	30.3	6.8	16.2	47.6				133	31.4	6.5	0.6	19.9	
The first measurement of body fluid percentage	Those visiting the dietician 2-4 times	79	58.7	4.4	0.5	0.7				79	58.8	4.3	0.0	0.5	
	Those visiting the dietician 5-8 times	36	58.7	5.6	0.5	0.7	.132	.877	The final measurement of body fluid percentage	36	59.8	7.8	0.0	0.5	.049 .952
	Those visiting the dietician 9 times and more	18	57.6	5.4	0.5	0.7				18	58.2	7.7	0.0	0.5	

	Total	133	58.5	5.3	0.5	0.7				133	58.7	6.7	0.0	0.5		
The first measurement of BMR	Those visiting the dietician 2-4 times	79	1343.5	172.3	1065.0	1790.0	.868	.422	The final measurement of BMR	79	1365.3	167.5	18.8	1127.0	.984	.376
	Those visiting the dietician 5-8 times	36	1325.2	156.8	1103.0	1729.0				36	1353.0	164.7	27.5	1138.0		
	Those visiting the dietician 9 times and more	18	1285.3	196.6	1024.0	1731.0				18	1303.3	185.4	43.7	1108.0		
	Total	133	1330.7	171.5	1024.0	1790.0				133	1353.6	169.2	14.7	1108.0		
The first measurement of BMI	Those visiting the dietician 2-4 times	79	20.6	2.9	14.8	29.2	.332	.718	The final measurement of BMI	79	20.7	2.5	0.3	15.7	.195	.823
	Those visiting the dietician 5-8 times	36	20.2	2.7	16.2	28.5				36	20.4	2.4	0.4	16.7		
	Those visiting the dietician 9 times and more	18	20.8	3.4	15.5	29.4				18	20.4	3.2	0.7	16.0		
	Total	133	20.5	2.9	14.8	29.4				133	20.5	2.6	0.2	15.7		
The first measurement of WHR	Those visiting the dietician 2-4 times	79	0.7	0.1	0.6	0.9	.158	.854	The final measurement of WHR	79	0.7	0.1	0.0	0.6	1.268	.285
	Those visiting the dietician 5-8 times	36	0.7	0.1	0.6	0.9				36	0.7	0.1	0.0	0.6		
	Those visiting the dietician 9 times and more	18	0.7	0.1	0.6	0.8				18	0.7	0.1	0.0	0.6		
	Total	133	0.7	0.1	0.6	0.9				133	0.7	0.1	0.0	0.6		

Considering the distribution of the differences between the measurement averages in the first and final visits of the swimmers who visited the dietician 2-4 times, the differences among the measurement averages of height, weight, muscles, body fluid and BMR are significant (See:Table 4-19).

Table 4-19 The Distribution of the Differences Between the Measurement Averages in the First and Final Visits of the Swimmers Visiting the Dietician 2-4 Times

	n	Average	STD	t	p
The first measurement of height(cm)	72	157.9	12.5	-4.633	0.000
The final measurement of height (cm)	72	159.0	11.9		
The first measurement of weight (kg)	79	52.3	13.0	-2.316	0.023
The final measurement of weight (kg)	79	52.9	12.4		
The first measurement of fat	79	10.0	4.9	-0.096	0.924
The final measurement of fat	79	10.0	4.6		
The first measurement of fat percentage	77	18.4	6.1	.376	0.708
The final measurement of fat percentage	77	18.3	5.9		
The first measurement of muscles	79	39.4	8.6	-3.740	0.000
The final measurement of muscles	79	40.0	8.3		
The first measurement of body fluid	79	30.6	6.7	-3.719	0.000
The final measurement of body fluid	79	31.0	6.5		
The first measurement of body fluid percentage	79	58.7	4.4	0.000	1.000
The final measurement of body fluid percentage	79	58.8	4.3		
The first measurement of BMR	79	1339	169.6	-3.853	0.000
The final measurement of BMR	79	1349	165.7		
The first measurement of BMI	79	20.5	2.7	-0.275	0.784
The final measurement of BMI	79	20.5	2.5		
The first measurement of WHR	79	0.7	0.1	-1.157	0.251
The final measurement of WHR	79	0.7	0.1		

Considering the distribution of the differences between the measurement averages in the first and final visits of the swimmers who visited the dietician 5-8 times, the differences among the measurement averages of height, weight, muscles, body fluid and BMR are significant (See:Table 4-20).

Table 4-20 The Distribution of the Differences Between the Measurement Averages in the First and Final Visits of the Swimmers Visiting the Dietician 5-8 Times

	n	Ort.	STD	t	p	
The first measurement of height(cm)	36	157.2	13.7	-5.044	0.000	
The final measurement of height (cm)	36	161.0	12.2			
The first measurement of weight(cm) (kg)	36	50.9	13.7	-3.516	0.001	
The final measurement of weight (kg)	36	53.4	12.9			
The first measurement of fat (cm)	36	10.0	5.8	-0.333	0.741	
The final measurement of fat	36	10.1	5.1			
The first measurement of fat percentage(cm)	34	18.4	7.7	0.485	0.631	
The final measurement of fat percentage	34	18.1	6.3			
The first measurement of muscles(cm)	36	38.0	8.8	-3.714	0.001	
The final measurement of muscles	36	39.9	8.8			
The first measurement of body fluid (cm)	36	29.5	6.9	-5.428	0.000	
The final measurement of body fluid	36	31.2	6.6			
The first measurement of body fluid percentage (cm)	36	58.7	5.6	-1.070	0.292	
The final measurement of body fluid percentage	36	59.8	7.8			
The first measurement of BMR (cm)	36	1304.1	169.6	-4.671	0.000	
The final measurement of BMR	36	1339.3	171.4			
The first measurement of BMI (cm)	36	20.2	3.2	-0.679	0.502	
The final measurement of BMI	36	20.4	2.8			
The first measurement of WHR (cm)	36	0.7	0.1	-0.253	0.801	
The final measurement of WHR	36	0.7	0.1			

Considering the distribution of the differences between the measurement averages in the first and final visits of the swimmers who visited the dietician 9 times and more, the differences among the measurement averages of height, weight, body fat percentage, muscles, body fluid and BMR are significant. The significance in these measurements is towards the final measurement. Nutrition consultancy can be said to have developed in line with its contribution to the body measurements of the athletes and the sports performed by them (See: Table 4-21).

Table 4-21 The Distribution of the Differences between the Measurement Averages in the First and Final Visits of the Swimmers Visiting the Dietician 9 and + times

	n	Average	STD	t	p	
The first measurement of height(cm)	18	159.2	12.4	-6.814	0.000	
The final measurement of height (cm)	18	165.6	10.6			
The first measurement of weight(cm) (kg)	18	54.6	15.3	-3.231	0.005	
The final measurement of weight (kg)	18	58.1	13.2			
The first measurement of fat (cm)	18	11.5	5.8	0.008	0.994	
The final measurement of fat	18	11.5	4.9			
The first measurement of fat percentage(cm)	18	20.0	7.5	1.567	0.005	
The final measurement of fat percentage	18	18.6	6.1			
The first measurement of muscles(cm)	18	39.9	9.2	-5.697	0.000	
The final measurement of muscles	18	43.2	8.5			
The first measurement of body fluid (cm)	18	31.0	7.2	-5.594	0.000	
The final measurement of body fluid	18	33.5	6.6			
The first measurement of body fluid percentage (cm)	18	57.6	5.4	-.837	0.414	
The final measurement of body fluid percentage	18	58.2	7.7			
The first measurement of BMR (cm)	18	1347.4	187.3	-4.606	0.000	
The final measurement of BMR	18	1402.6	180.9			

5. DISCUSSION AND RESULT

This study, which was conducted between 2007-2012 (within the 5-year-period) for the purpose of analyzing the changes in the body compositions of junior and pubescent/adolescent swimmers according to the frequency of the consultancy received from a dietician trained and involved in nutrition for athletes by using the ‘’ Athlete Data Form’’, anthropometric measurements and body analysis results, comprised 168 partaking swimmers, 54.1% of whom were male. On the other hand,the average of age was found to be 12.68±2.15. In this study, since the measurement differences of those visiting the dietician once before and after training cannot be calculated along with the measurement averages, they have not been included in the calculations. According to this classification, 59.4%) of the swimmers went to the dietician 2-4 times, and 27.1% of them visited the dietician 5-8 times, whereas 13.5% of them visited the dietician 9 times and more. The conducted studies suggest that there is an increase in the performances of the athletes who have a regular diet with a nutrition program involving balanced nutrients. (70-74). In our study, 72.1% of the swimmers have pre-training meals, while 89.2% of them have post-training meals. Sufficient and balanced nutrition habits increase the total training and performance values in athletes. However, such a fact is not as easily and tangibly observed as in the improvements acquired in the condition and post-workouts/trainings. For this reason, nutrition, according to some athletes, means nothing more than a weak chain in the whole main purpose (74). Yet, the conducted studies suggest that well-arranged nutrition/dietary programs practised along with the training programs have increased performance.

In our study, 80.1% of the swimmers have no diet history. 84% of those who had regular diet programs followed this schedule under the guidance of a dietician, which is a positive indicator.

According to NHANES III, total liquid intake includes total drinking water intake along with the liquid foods and the fluid taken in through nutrients. The daily liquid intake in young men and women aged between 19-30 should be between 2.7-3.7 Lt (52). In our study, the average fluid consumption of the swimmers per person was found as 2034.11 ml. It was found that the male swimmers consumed 2039.74 ml fluids on average, while the female ones consumed 2029.46 ml on average. In the light of these data, the daily fluid consumption of the swimmers who participated in our study is low according to the international guidelines on nutrition for athletes. Also in the study conducted by Yıldırım et al. (72), the total fluid consumption of the individuals on average was estimated/calculated to be 3674.82±1180.76 ml. It was reported that the fluid consumption of the individuals was at a rate of 50% according to the nutritional record method and the amount of their daily fluid consumption in the general assessment questionnaires. 50% of the total fluid consumption in our study also involves fluid consumption.

In a study conducted by Schröder et al. (75) along with the adult elite basketball players, it was reported that the total fluid amount from the beverages of these basketball players was 3.126±1.226 ml on the average and that water (1688±1032 ml) and milk (445±521 ml) were the beverages determined to have been mostly consumed by them. In the study conducted by Yıldırım (72), there is more water and fruit consumption than is reported in this study, while the consumption of other beverages is lower.

In the study called “Healthy Lifestyle in Europe by Nutrition in Adolescence”, which was conducted in 8 countries, such as Germany, France, Italy, Austria, Sweden and Spain, 1590 adolescents whose average age was between 12.5-17.5 got involved in the study, and the following results were achieved (76):

- Adolescents take in several macro and micronutrients, vitamins and minerals in recommended amounts.
- Short-chain fatty acids and salt consumption are in very high amounts.
- Vitamin D, folate, iodine and fluorine consumption is half of the recommended amount.

On the other hand, in another study conducted with 300 adolescents aged between 12-19 in Ankara, it was found that the rate of total fat intake was low, the saturated fatty acid intake was high, the cholesterol and sodium intake was also high, the intake of Vitamin E, Vitamin B6 and folate was low, the fruit and vegetable consumption was low, and that 18-22% of them were smokers, whereas 50% of them were physically active (at medium level). In the same study, it was also reported by reviewing the missing meals of the adolescents that 38.7% of them had no breakfast at all (76).

There are major differences between the contribution of vitamins and minerals to sufficient and balanced nutrition and the effects they have as medications. The best way of receiving vitamins and minerals necessary for vitality and high performance is to receive them naturally, in other words, through the nutrients. In general, if a food nutrition chart that can meet the daily energy requirement is followed, then playing an efficient role in the formation of food paths, the vitamin and mineral requirement of the ATP necessary for trainings and competitions is greatly likely to be met (77).

According to ISSN, some specific vitamins, such as vitamin E, niacin, folic acid and vitamin C, are beneficial to the health of athletes. In some articles are also the direct ergogenic characteristics of these vitamins reported. Some vitamins may promote endurance in the physically active individuals during their heavy exercises or trainings, as the result of which the exercise performance develops. Furthermore, vitamin C and E supports the immune system by alleviating the oxidative damage caused by heavy training programs (8).

In the study conducted by Koçyiğit et al. (58) where *the effects of* loading Vitamin C to the footballers and basketball players in the wake of their 3-week-training and the administration of Vitamin C *on* the blood iron (Fe++), total iron binding capacity (TIBC), glucose and insulin values *are studied,* it is suggested that the Vitamin C loading process increases the Fe++ level while reducing TIBC level.

The energy expenditure of the competitive swimmers is high due to the fact that they swim at a high intensity like approximately 4 hours a day, that they need to do heavy workouts in order to strengthen their muscles a couple of times a week and sustain their performance and that they also need to continue their daily life activities (78, 79). Training, on the other hand, is simply one of the several stressors that challenge an athlete each day. The training will progress normally and the performance will improve to the extent that the athlete adapts himself/herself to the total load/burden of the stressors s/he confronts. The weariness/tiredness resulting from the loads of trainings has to be immediately eliminated. The organism may require 24-48 hours to be able to pull itself together again after severe loading processes.

In our study, 39,1% of the swimmers aimed to increase their performance, whereas 36,1% of them aimed to strengthen their muscles, and 19% of them aimed to lose weight. The analysis of the individual performance profile curves formed in the countries which are developed in swimming is to reduce the excessive loading risk in swimmers, to be able to bring the loading-resting relations under control, and to establish the fields of basic study and interest for the club coaches and their sponsor administrators and the educational and technical boards of federations. This topic, which is of major significance in terms of the development and follow-up of performance, is rarely practised in our country for various reasons (79).

Performance swimming is a sports branch through which a delicate balance is maintained between the muscle strength / power and endurance and that which challenges the physiological systems performing efficiency, where the technical skills are at the forefront.

Different from the physical activities performed on land, swimming provides convenience for the swimmer on an upright/vertical axis while being performed in an environment where the impact resulting from the gravity decreases a great deal; however, the fact that the activity is being performed in a much denser environment than the air becomes a resistance for the swimmer to cope with. Therefore, the performance in swimming depends on the relationship between the repelling force caused by the swimmer and the resistance of the water on the swimmer.

Among the factors that increase the repelling force are the muscle strength, aerobic and anaerobic energy systems, muscular endurance and stroke techniques. The body composition and anthropometric features are the factors that reduce the resistance formed against water (80).

As is seen in a number of sports branches, the physical characteristics determining the success in swimming can be mentioned, as well. Any sort of anthropometric characteristics that may enable the swimmer to become hydrodynamically advantageous when compared with his/her opponents/competitors are almost commonly seen in the swimmers regarded as successful. Thus, almost always a given phenotypic outlook is mentioned while defining a performance swimmer (80).

In our study, according to the first and final measurement results of the swimmers, the average height of the swimmers was found to be 157.9±12.8 and 160.5±12.0, while the average weight was 52.3±13.5 and 53.8±12.6. The first measurement average height of the male swimmers who participated in our study was 159.2±15.1 and the final measurement average height was 162.3±14.3; on the other hand, the first measurement average height of the female swimmers was 156.9±10.8 and their final measurement average height was 159.2±9.6. The difference between the two measurements is significant. The first measurement average weight of the male swimmers was found to be 55.6±15.8 and their final measurement average weight was 57.1±14.7, whereas the first measurement average weight of the female swimmers was found to be 49.6±10.7 and their final measurement average weight was 51.1±10.0.

According to 2008 report of CDC regarding the Anthropometric Data for Children and Adolescents in the USA, 2003-2006, the average weight of the male children aged between 7-17 was determined as 55.2 kg, and the female ones as 54.3 kg. The average height of the children within the same age group was reported to be 158.4 cm in male children and 156.1 cm in female ones (81). According to this report, the height and weight of the male and female swimmers who took part in our study range in the 50% percentile (Appendix 7-8).

According to the "Multicenter Growth Reference Study Group" report released by WHO in 2007, the height and weight of the male swimmers are in 85th percentile, while the height and weight of female swimmers are in 50th percentile (82) (Appendix 2).

In the research carried out by Özçaldıran and Doğan (79), where 10-12 year-old 43 male athletes, 21 of whom headed towards swimming and 22 of whom headed towards football were involved, it was reported that the average height in the swimmers was 147.44±7.36, while the average weight was 41.37±7.02 ant the fat percentage was 10.44±2.33.

In another study by Ayan and Olcay (83), which was conducted in Ankara among 8-10-year-old male children selected according to their skills in sports and to guide them towards sports, their average weight was found as 30.67±6.90 and their average height as 133.01±5.99.

Özgün et al. (84), in their study, found that the average weight of male children aged 9 was 31.05±7.66 kg, while their average height was 130.42±6.99 cm.

In the study by Kürkçü et al (85), it was determined that the average weight of the little/junior footballers aged 13.3±1.0 years was 48.21±8.41 kg; whereas their average height was 150.80±10.05 cm.

In the study by Arabacı et al (86), the average weight and height of male children aged between 9-10 were found to be 34.5±7.59 kg and 141.3±8.54 cm, respectively. These values are seen to be higher than the average values of our study group.

In the study by Parlak et al. (71), it was determined that the average body weight of female star basketball players was found as 5.7%, which was over the ideal body weight. 85.7% of the individuals (12 people) were determined to be at a value over their ideal weight.

In our study, an increase in height and weight along with the growing age has been observed. Such an increase is seen in some of the studies conducted on basketball players (87, 88).

Considering some studies conducted on swimmers, it was found that the height and weight of the 13-year-old male players who were the members of the Canadian National and National Youth Teams were 168.2±7.7 cm and 58.1±9.3 kg; whereas those of the males aged 14 years old were 174.2±5.9 cm and 63.9±7.2 kg, respectively; on the other hand, the height and weight of the 15- year- old males were 176.9±5.7 cm and 65.8±6.5 kg, respectively (87).

In another study, the average height of 8 swimmers aged between 17-20 and that of 8 crawl/tracked swimmers aged between 17-26 was 180.4±3.09 cm, 177.2±5.62 cm, respectively, and their body weight was found to be 79.4±6.6 kg and 71.5±3.89 kg (87, 88).

In the studies conducted on swimmers, the height and weight of the elder swimmers were also observed to be higher.

Considering the studies conducted on volleyball players, it was found that the average age, height and weight of 40 volleyball players (20 male, 20 female) aged between 9-14 who were actively engaged in sports and those of 40 sedentary individuals (20 male, 20 female) were 11.2±1.3 years, 146.8±5.4 cm and 35.4±4.0 kg; and 11.4±1.2 years, 143.7±5.1 cm and 37.1±5.1 kg, respectively (89).

The age, height and weight of 20 volleyball players analyzed and examined in another study were determined to be 19.55±0.5 years, 185.2±1.6 cm and 79.4±2.1 kg, respectively, whereas the age, height and weight of 20 basketball players were found to be 23.6±.7 years, 188.2±1.9 cm, and 84.7±2.9 kg, respectively (90).
In a study where 153 young volleyball players were involved, the average age, height and weight of males (n=57) were ascertained to be 15.6±0.1 years, 205.0 cm and 91.6 kg, respectively. (91). In these studies conducted on volleyball players, an increase in the height and weight along with the age was also observed.

The weight with which the best performance is maintained is the ideal weight. However, the body weight alone does not provide information as to the genuine body composition. The ideal weight is determined according to the fat percentage of the body. According to the studies performed so far, the body fat weight of an adult male swimmer is 5-10% of the whole body weight; in the female swimmers, however, this rate is between 14-26%. Keeping the body weight and the body composition stable is the best way to obtain energy balance (92).

In our study, according to the swimmers' first and final measurement results, the first measurement of the average body fat was determined as 10.2±5.3, whereas the final measurement of it was found as 10.3±4.8. As for the average fat percentage, on the other hand, the the first measurement was found to be 18.6±6.5, whereas the final measurement was 18.3±5.9. The difference between the two measurements was found insignificant. On the other hand, the first measurement of average fat percentage in males was found to be 15.9±6.8 and the final one was 15.5±6.2, whereas in female swimmers, the first measurement of average fat percentage was determined to be 20.8±5.3 and the final one as 20.6±4.5. The greatest difference here is the difference between the first and the final measurement values of fat percentage found in the group who visited the dietician 9 times and more (first measurement: 20.0±7.5 and final measurement: 18.6±6.1).

This outcome suggests how effective results a scientific study conducted in company with a long-term expert dietician can produce. In our study, the fact that the fat percentage remains the same while an increase in height and weight is observed along with the age, or that it even diminishes in those visiting the dietician 9 times and more has a positive impact on the performance of the swimmers. The first measurement average of the muscle mass was found to be 39.1±8.7, whereas the final measurement average of it was determined to be 40.4±8.5. The first measurement average of the muscle mass in males was found as 42.8±9.9 and the final measurement average as 44.4±9.6, while, in female swimmers, the first measurement average of the muscle mass was determined to be 36.2±6.2 and the final measurement average was found as 37.2±5.9. The differences between the measurement averages in both of the groups are significant. The increase in the athletes' muscle masses has a positive effect on their performance.

Again, in our study, the first/initial fluid measurement average of the swimmers was 30.3±6.8, while the final one was 31.4±6.5, and the fluid percentage was 61.07±4.76%. In female swimmers, the first fluid measurement average was found as 28.1±4.9, and the final one was 29.0±4.5, whereas the fluid percentage in both of the measurements was found to be 60.0±1.0% . In males, however, the first fluid measurement average was found as 33.1±7.8 and the final fluid measurement average as 34.3±7.5. As for the fluid percentage, , the first fluid measurement average in males was determined to be 60.5±5.0 and the final one as 61.4±6.5, while the first fluid measurement average in females was found as 57.0±3.8, and the final one as 57.1±3.2. The differences between groups are not significant. These results are healthy according to the literature. (water/fluid: 55-70%). Again, here the greatest difference is the one between the first and final measurement values of fluid percentage seen in the group visiting the dietician 9 times and more. (the first measurement: 57.6±5,4 and the final measurement: 58.2±7.7). It was seen that the dietary habits and the water intake habits in particular developed in a positive way as the result of the long-term follow-up under the guidance of a dietician.

Parlak et al. determined in their study that the average body fat percentage values of the female star basketball players proved to be 14.6±2.5%, their body fat mass was 9.1±2.2 kg, while their fat-free body mass was 53.0±5.1 kg, which were calculated by using Skinfold Thickness (ST) scales/measurements. (71). The average body fat percentage of the basketball players playing in the 1st, 2nd and regional leagues in Turkey was found as 14.6±3.0%, 12.5±3.0%, and 14.1±2.5%, respectively (93).

The average body fat percentages of the young male 2nd League basketball players in Turkey were found as 12.78±5.84% (93). In a study conducted on 60 basketball players aged between 16-32, it was determined that the body fat percentage of the basketball players was 11.5±4.6%. (94). In another study conducted on 20 male volleyball players aged between 9-14, who are actively involved in sports, the average body fat percentage, the body fat mass and the fat-free body mass were found as 12.2±1.1%; 3.7±0.7 kg and 33.4±5.6 kg, respectively (95).

In a study by Alemdar et al., it was determined that the average body fat percentage (calculated by means of Yuhasz method) of 8 swimmers aged between 17-20 and 8 crawl/tracked swimmers aged between 17-26 were found as 12.68±2.35% and 10.42±1.53%, respectively, whereas their body fat percentages were determined to be 10.19±2.56 kg and 7.48±1.46 kg, and their fat-free body mass was found as 69.2±4.3 kg and 64.0±2.54 kg, respectively. (97).

Hebestreit et al. reported in their studies in 1993 that the body fat percentage of 8 boys aged between 8-12 was 16.3±4.8%, and the body fat percentage of males aged between 18-23 was 15.3±3.4% (96).

The daily energy requirement of the body, BMR is the sum of the thermic effect of the physical activity and the nutrients taken in. BMR comprises most of the total energy expenditure, and the performed physical activity varies from person to person (98).

In our study, the BMR average/mean according to the first measurement results of the swimmers was found as 1330.7±171.5, while the final measurement average was found to be 1353.6±169.2. BMR initial/first measurement average/mean in male swimmers was 1421.5±209.1 and the final one was 1454.8±199.0, whereas the initial/first measurement average/mean in female swimmers was 1258.5±80.6 and the final one was 1272.9±173.8.

According to the calculation of BMR recommended by Pekcan in his study, the BMR values which have been found represent the light/mild metabolic rate. (99).

BMI is a parameter used in the evaluation of the body weight for normal population. The BMI first measurement average was found as 20.5±2.9, while the final measurement was found as 20.5±2.6. In male swimmers, the first measurement BMI mean/average was determined to be 21.1±3.2 and the final one was 21.1±2.8; whereas the first measurement BMI mean/average in females was found to be 20.0±2.5 and their final measurement mean was 20.1±2.3. The BMI values are within normal boundaries according to the literature. According to CDC's report of 2008, the BMI values of male and female swimmers are between the 50^{th} % and 75^{th} % percentiles (81) (Appendix 7).

According to WHO ‘s report of 2007, on the other hand, male swimmers were found between the 85th % and 95th % percentiles, while the female ones were found between 50th % and 85th % percentiles (82)(Appendix 4). These results obtained in our study are in accordance with the international values.

The WHR average/mean in our study was found as 0.7±0.1 in the first and the final measurements.

In the report of the Ministry of Health (100) referred to as “Determining the Nutrition Status”, it is stated that the ‘’ waist circumference measurement’’ is also used alone and can be definitive/descriptive for the risk of chronic diseases. The waist-hip ratio (WHR) in males should not be over 1.0 and over 0.8 in females, since it is pointed out that this is ‘’the indicator’’ of the risk of the incidence of android obesity and the chronic diseases related with obesity. Accordingly, the WHR rates of the swimmers who participated in our study fall within the desired values.

In the study conducted in 2004 by Sınırkavak et al. (101) on the elite athletes regarding their body composition, it was reported that the BMI values of the male elite athletes were 22.35 ± 0.38, whereas these values in the female elite athletes were 19,84 ± 0,49. The fact that the swimmers with normal body weights (BMI:20-25) comprise the majority is a positive finding.

In another study conducted by Memiş et al. On the evaluation of dietary habits of higher education students, it was reported that when the nutritional statuses of the female students were assessed, those whose BMIs were below 20 were found to be around 32.6%, while those with BMIs above 25 were found to be around 9%. In male students, on the other hand, those with BMI <20 were 21.6%, while those with BMI >25 were 9.2%. (102).

The excess/overbalance in the muscle mass of the athletes in several sports branches in particular may cause the BMI value to prove to be high and to be misevaluated. For this reason, taking also the body fat percentage into consideration along with weight and height would yield more accurate results.

The purpose of the nutrition for athletes is to ensure that an athlete receives sufficient and balanced nutrition in accordance with his/her age, gender, physical activity, nutritional/dietary habits and energy expenditure. For many athletes, however, it is of great importance, apart from the general dietary rules; to have the knowledge of nutrition/diet unique to the sports branch performed (11). Thus, nutrition consultancy is of vital significance for all athletes.

A dietician helps an athlete or a sportsman improve/develop his/her performance by ensuring the energy balance of the athlete and the maintenance of the nutrient-concentrated diet by means of an attentive education and training, correct timing of food intake and adequate amount of resting.

In our study, considering the change in the measurements of the swimmers under the guidance of the dietician, it is seen that when the first and final visit measurement averages of the swimmers who went to the dietician 2-4 times, 5-8 times and 9 times and more are examined, the differences among the measurement averages of height, weight, muscles, body fluid and BMR in all the three groups are significant and seem to have showed an increase. The average of fat percentage, on the other hand, diminished significantly in the group who received consultancy 9 times and more. According to these results, the regular and long-term nutrition consultancy in particular can be said to have a positive effect on the body measurements of athletes. The differences among all of these measurements are both statistically and clinically significant.

In this study analyzing/examining the change in the body compositions of junior and adolescent swimmers who received nutrition consultancy according to the frequency of the consultancy received from a dietician trained and involved in nutrition for athletes, it was concluded that the nutrition consultancy to be received by athletes would make a significant contribution to their performances, however, this impact would only manifest itself within years after regular follow-ups.

RESULTS

The results of this study examining the changes in the body compositions of junior and pubescent/adolescent swimmers according to the frequency of the consultancy they received from a dietician trained and involved in nutrition for athletes by using the ‘’Athlete Data Form’’, anthropometric measurements and body analysis results between 2007-2012 (within a 5-year-period) are as follows:

* 54.1% of 168 swimmers who received nutrition consultancy between 2007-2012 (5-year- period) were male. The average of their age was found to be 12.68 ± 2.15.

* Considering the fluid consumption of the swimmers, it was found that the average fluid consumption per person was 2034.11 ml and that the average fluid consumption/ person in males were 2039.74 ml, whereas this amount in female swimmers was 2029.46 ml on the average. The rate of water/fluid intake was around 50%, while the rate of the consumption of sports drinks was about 16%.

* When the distribution of the swimmers according to their targets were examined, it was found that 39.1% of them responded with an increase in their performance, while 36.1% of them had their muscles strengthened and 19% of them lost weight.

* In our study, in accordance with the first/initial and final measurement results of the swimmers, the height mean/average was found as 157.9±12.8 and 160.5±12.0, respectively, whereas the weight mean/average was determined as 52.3±13.5 and 53.8±12.6, respectively. The first measurement height average/mean of the male swimmers was 159.2±15.1 and their final measurement height average was 162.3±14.3, while these measurements in female swimmers were determined as 156.9±10.8 and 159.2±9.6, respectively.

* The first measurement weight average/mean of the male swimmers was 55.6±15.8 and their final measurement weight average was 57.1±14.7, while these measurements in female swimmers were determined as 49.6±10.7 and 51.1±10.0, respectively.

* In our study was an increase in height and weight observed along with the age.

* The first measurement of the average fat was found to be 10.2±5.3, whereas the final measurement of it was found as 10.3±4.8.

* The first measurement of the average fat percentage, on the other hand, was 18.6±6.5, while the final measurement was 18.3±5.9. The difference between the two measurements was found insignificant.

*On the other hand, the first measurement of the average fat percentage in male swimmers was found as 15.9±6.8 and their final measurement as 15.5±6.2, whereas these first/initial and final measurements in females were 20.8±5.3 and 20.6±4.5, respectively. The greatest difference here is the difference between the first and the final measurement values of fat percentage found in the group who visited the dietician 9 times and more (first measurement: 20.0±7.5 and final measurement: 18.6±6.1).

* The first measurement average of muscles was found as 39.1±8.7, and their final measurement average/mean was found to be 40.4±8.5. The first measurement average of muscles in male swimmers was ortalaması 42.8±9.9 and their final measurement average was 44.4±9.6, while these measurement averages in female swimmers were determined to be 36.2±6.2 and 37.2±5.9, respectively. The differences among the measurement averages in both of the groups are significant.

* The first measurement average of body fluid of the swimmers was 30.3±6.8 and the final fluid measurement average was 31.4±6.5, while the fluid percentage was 61.07±4,76%. The first measurement average of body fluid in female swimmers was found as 28.1±4.9 and their final fluid measurement average was 29.0±4.5, whereas the fluid percentage was found to be 60.0±1.0% in both of the measurements. On the other hand, the first measurement average of body fluid in male swimmers was 33.1±7.8, while the final one was 34.3±7.5.

* The first measurement average of body fluid percentage in males was found to be 60.5±5.0, and their final body fluid measurement mean/average was 61.4±6.5, whereas in female swimmers, these averages were 57.0±3.8 and 57.1±3.2, respectively. The differences between groups are insignificant.
*The first measurement average of fluid percentage in the group visiting the dietician 9 times and more was determined to be 57.6±5.4 and their final measurement average was found to be 58.2±7.7.

*According to the first measurement results of the swimmers in our study, the average BMR was found as 1330.7±171.5 and the final measurement average was found to be 1353.6±169.2. In male swimmers, the first and the final measurement averages of BMR were 1421.5±209.1 and 1454.8±199.0, while these averages in females were found to be 1258.5±80.6 and 1272.9±173.8, respectively.
* The first measurement average of BMI along with the final one were 20.5±2.9 and 20.5±2.6, respectively. The first measurement BMI average in male swimmers was 21.1±3.2 and the final one was 21.1±2.8, whereas these first and final BMI averages in female swimmers were 20.0±2.5 and 20.1±2.3, respectively.
*The WHR average in the first and final measurements was determined to be 0.7±0.1.

As a result, the anthropometric measurements of athletes under the guidance of their dieticians have changed in a positive way in the wake of the practice of healthy nutritional training and special diet for athletes.

This study puts forward the necessity under the leadership of dietary knowledge supported by scientific researches that the families and sports coaches of athletes receive education and training on nutrition. The best sources from whom dietary education and training can be received by the athletes and their families and coaches in a beneficial way are the dieticians. The maintenance of efficient nutritional/dietary trainings is essential for changing the habits through the education received. The importance of nutrition must be emphasized for the success and health of the athletes.

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FORMLAR

Ek 1: Sporcu Veri Formu

TARİH:…./…./2011

KİŞİSEL BİLGİLER

Ad Soyad :

Anne ve Baba Adı:

Cinsiyet:

Evde yaşayan birey sayısı:

Yaş : Doğum Tarihi:

Okulun tam-yarım gün oluşu:

Boy(cm) :

Okulunuzun adı:

Kilo(kg) :

Yaptığınız Spor Türü:

Antrenör Adı:

Branşınız:

Doktorunuzun adı:

Spor yaptığınız kulüp:

İLETİŞİM BİLGİLERİ

İş/Ev adres:

İş tel : **Ev tel.:** **Cep tel.:**

E-posta adresi:

Web siteniz (varsa):

BESLENME ALIŞKANLIKLARI

1-Günde kaç öğün yemek yersiniz?

2- Bu öğünler hangileridir?:

3-Hangi öğün veya öğünleri atlarsınız?

4- Öğün atlamanızın sebebi:

5-Öğün aralarında atıştırma yapar mısınız?

Evet Hayır Bazen

6-Atıştırmalık olarak neleri tercih edersiniz? (en çok tercih ettiğiniz seçeneği işaretleyiniz)

- Hamur işi besinler
- Meyve, meyve suyu
- Kolalı içecek, sade-meyveli gazoz vb.
- Süt, yoğurt, ayran, peynir, dondurma
- Şekerler, çikolata, gofret vb.
- Kuruyemiş
- Çiğ sebze
- Diğer ……

SIVI TÜKETİMİ

7- Bir gün içerisinde aşağıdaki içeceklerden ne kadar tüketiyorsunuz?

Süt :	……Su bardağı	Hazır meyve suyu : ……Su bardağı		
Maden suyu :	……Su bardağı	Taze sıkılmış m.suyu: …Su bardağı		
Türk Kahvesi :	……Fincan	Çay : …… bardağı	Çay ……..	
Diğer kahve çeşitleri	……Fincan	Su : ……	……..	Su bardağı
Ice Tea vb içecekler	……Kutu	Kolalı İçecekler	…….	Bardak
Sporcu İçeceği	……	Şişe(500ml)		

Diğer…….

YEMEK PİŞİRME YÖNTEMLERİ

7- Evde yemeği kim pişirir?

8.Yemek pişirirken en çok hangi yöntemler kullanılıyorsunuz?

İzgara Kızartma Haşlama Kendi Suyunda Kavurma Diğer

9.Yemeklerde hangi yağı kullanırsınız? (Yanına zeytinyağı, margarin vb yazmanız yeterlidir)

Salata ve Sebze yemeklerinde :

Pilav, makarna, çorbalarda :

Kek, kurabiye vb.de :

Diğer :

10- Besin alerjiniz var mı? ☐Var (Alerjiye sebep olan besin:……..) ☐Yok

BESLENME DAVRANIŞLARI

11-Vazgeçemem dediğiniz yiyecekler var mı? Nelerdir?:

12.Yemekleri hızlı mı yersiniz?

13.Öğün saatleriniz düzenli midir?

14.Sabahları iştahınız nasıldır? İyi Orta Kötü

15.Yatmadan 1 saat öncesine kadar yemek yer misiniz?

16.Geceleri yemek yer misiniz? (özellikle geç saatlerde uyanıp)

HEDEFLER

Sağlıklı beslenme programı sonucunda hedefiniz nedir?

Kilo almak

Kilo vermek

Performans artışı

Kasların güçlenmesi

VÜCUT AĞIRLIĞI ÖYKÜSÜ

4-Daha önce herhangi bir diyet uyguladınız mı?

5-Diyet yapma öykünüzü anlatınız:

6-Diyet kim tarafından verildi:

†Doktor †Diyetisyen † Gazete- Dergi Diyetleri †Diğer(Yazınız)……

FİZİKSEL AKTİVİTE DURUMU

1-Fiziksel aktivite yapmaktan hoşlanır mısınız?

2-Fiziksel aktivite yapmanıza engel olan herhangi bir sağlık probleminiz var mı?

Evetse; Nasıl bir probleminiz var?

3-Yapmaktan zevk aldığınız aktiviteler nelerdir? İşaretleyiniz.

†Yürüyüş	†Yüzme	†Koşu
Bisiklete binmek	†Aerobik	†Tenis/ /masa tenisi/squash
†Kondisyon eğitimi	†Basketbol	†Golf
	†Dans	†Diğer(Yazınız)

4-Rutin bir günde ;

Kaç saat uyursunuz? Akşam kaçta yatarsınız?

Antrenman günleri ve saatlerini yazınız.

	okul döneminde	tatilde
Pazartesi		
Salı		
Çarşamba		
Perşembe		
Cuma		

Cumartesi

Pazar

Antrenman öncesinde ve sonrasında bir şeyler yer misiniz? Yediklerinizi yazınız.

SAĞLIK DURUMUNUZ VE TIBBİ ÖZGEÇMİŞİNİZ

1- Kullandığınız ilaç var mı? †Evet İlaç:…….. Sebebi:

2-Aşağıdaki hastalık ya da belirtilerden geçirdiklerinizi veya şu anda mevcut olanları işaretleyiniz.

Hipertansiyon	Cerrahi operasyon	Tüberküloz (Verem)	Gastrit
Hipotansiyon	Hipotiroidi	Tekrarlayan ishal	Mide veya barsak ülseri
Kalp hastalığı	Hipertiroid	Kabızlık	Kansızlık
Reflü	Nefes darlığı	Astım	İdrar yolu enfeksiyonu
Böbrek taşları	Çölyak	Diyabet	Allerji
Kolit	Sarılık	Yüksek kolesterol	

3- Spor fizyolojisi konusunda uzman bir doktor kontrolünde misiniz?

4- Doktorunuzun size yaptığı özel bir uyarı, uygulama varsa nelerdir?

RUHSAL DURUM ve BESLENME İLİŞKİSİ

1-Ruhsal durumunuz beslenmenizi etkiler mi?

Evetse ; Nasıl?

2- Yedikten sonra çok mutlu olduğunuz bir besin var mı? Bunlar nelerdir?

3- Nefret ettiğiniz bir besin var mı? †Evet †Hayır

4-Nefret ettiğiniz besinleri yazınız.

AİLENİZİN SAĞLIK DURUMUYLA İLGİLİ BİLGİLER

1-Ailenizde Şeker hastası olan birey var mı? †Evet †Hayır Varsa kim?.....

2-Ailenizde şişman birey var mı? ⁞Evet ⁞Hayır Varsa kim?.....

3-Ailenizde hipertansiyonlu birey var mı? ⁞Evet ⁞Hayır Varsa kim?.....

4-Ailenizde kalp hastalığı olan birey var mı? ⁞Evet ⁞Hayır Varsa kim?.....

5- Ailenizde kanser hastalığı olan birey var mı? ⁞Evet ⁞Hayır Varsa kim?.....

Bu bilgiler size özel beslenme planınızın oluşturulabilmesi için gereklidir.

Ek-2 Yaşa göre Vücut Ağırlığı (5-10 Yaş- Erkek ve Kız)-WHO, 2007

Persentil (kg)									Z-skor (kg)				
Yıl	Ay	3.	5.	15.	50.	85.	95.	97.	-2SD	-1SD	Medyan	+1SD	+2SD
ERKEK													
5	6	15.3	15.7	17.0	19.4	22.3	24.2	25.1	15.0	17.0	19.4	22.2	25.5
6	0	16.1	16.6	17.9	20.5	23.6	25.8	26.7	15.9	18.0	20.5	23.5	27.1
6	6	17.0	15.5	18.9	21.7	25.0	27.4	28.3	16.8	19.0	21.7	24.9	28.9
7	0	17.9	18.4	19.9	22.9	26.5	29.1	30.1	17.7	20.0	22.9	26.4	30.7
7	6	18.8	19.4	21.0	24.1	28.1	30.8	32.0	18.6	21.1	24.1	27.9	32.6
8	0	19.8	20.4	22.0	25.4	29.7	32.7	34.0	19.5	22.1	25.4	29.5	34.7
8	6	20.7	21.3	23.1	26.7	31.4	34.7	36.2	20.4	23.2	26.7	31.2	37.0
9	0	21.6	22.3	24.2	28.1	33.2	36.9	38.6	21.3	24.3	28.1	33.0	39.4
9	6	22.6	23.3	25.3	29.6	35.2	39.3	41.1	22.2	25.5	29.6	34.9	42.1
10	0	23.6	24.4	26.6	31.2	37.3	41.9	43.9	23.2	26.7	31.2	37.0	45.0
KIZ													
5	6	14.8	15.2	16.5	19.1	22.4	24.7	25.7	14.6	16.6	19.1	22.2	26.2
6	0	15.5	16.0	17.4	20.2	23.7	26.2	27.3	15.3	17.5	20.2	23.5	27.8
6	6	16.3	16.8	18.2	21.2	25.0	27.8	28.9	16.0	18.3	21.2	24.9	29.6
7	0	17.0	17.6	19.2	22.4	26.5	29.5	30.8	16.8	19.3	22.4	26.3	31.4
7	6	17.9	18.5	20.2	23.6	28.1	31.3	32.8	17.6	20.3	23.6	27.9	33.5
8	0	18.9	19.5	21.3	25.0	29.8	33.4	34.9	18.6	21.4	25.0	29.7	35.8
8	6	20.0	20.6	22.6	26.6	31.8	35.7	37.4	19.6	22.7	26.6	31.6	38.3
9	0	21.1	21.8	23.9	28.2	33.9	38.1	40.0	20.8	24.0	28.2	33.6	41.0
9	6	22.3	23.1	25.3	30.0	36.1	40.7	42.7	22.0	25.5	30.0	35.9	43.8
10	0	23.7	24.5	26.9	31.9	38.5	43.5	45.7	23.3	27.0	31.9	38.2	46.9

* WHO Multicentre Growth Reference Study Group. 2007.

Ek-3 Yaşa göre Boy Uzunluğu (5-19 Yaş- Erkek ve Kız)-WHO, 2007

Yıl	Ay	3.	5.	15.	50.	85.	95.	97.	-2SD	-1SD	Medyan	+1SD	+2SD
						ERKEK							
5	6	104.0	105.1	108.0	112.9	117.8	120.7	121.8	103.4	108.2	112.9	117.7	122.4
6	0	106.7	107.8	110.8	116.0	121.1	124.1	125.2	106.1	111.0	116.0	120.9	125.8
6	6	109.3	110.5	113.6	118.9	124.2	127.3	128.5	108.7	113.8	118.9	124.0	129.1
7	0	111.8	113.0	116.3	121.7	127.2	130.4	131.7	111.2	116.4	121.7	127.0	132.3
7	6	114.3	115.5	118.9	124.5	130.2	133.5	134.8	113.6	119.1	124.5	130.0	135.5
8	0	116.6	118.0	121.4	127.3	133.1	136.6	137.9	116.0	121.6	127.3	132.9	138.6
8	6	119.0	120.3	123.9	129.9	136.0	139.5	140.9	118.3	124.1	129.9	135.8	141.6
9	0	121.3	122.7	126.3	132.6	138.8	142.5	143.9	120.5	126.6	132.6	138.6	144.6
9	6	123.5	125.0	128.8	135.2	141.6	145.4	146.8	122.8	129.0	135.2	141.4	147.6
10	0	125.8	127.3	131.2	137.8	144.4	148.3	149.8	125.0	131.4	137.8	144.2	150.5
10	6	128.1	129.6	133.6	140.4	147.2	151.2	152.7	127.3	133.8	140.4	146.9	153.5
11	0	130.5	132.0	136.1	143.1	150.1	154.2	155.8	129.7	136.4	143.1	149.8	156.6
11	6	133.0	134.6	138.8	146.0	153.1	157.4	159.0	132.2	139.1	146.0	152.9	159.8
12	0	135.8	137.4	141.7	149.1	156.4	160.7	162.4	134.9	142.0	149.1	156.2	163.3
12	6	138.8	140.5	144.9	152.4	160.0	164.4	166.1	137.9	145.2	152.4	159.7	167.0
13	0	142.1	143.8	148.3	156.0	163.7	168.3	170.0	141.2	148.6	156.0	163.5	170.9
13	6	145.4	147.2	151.8	159.7	167.5	172.2	173.9	144.5	152.1	159.7	167.3	174.8
14	0	148.7	150.5	155.2	163.2	171.2	175.8	177.6	147.8	155.5	163.2	170.9	178.6
14	6	151.7	153.5	158.3	166.3	174.4	179.1	180.9	150.8	158.5	166.3	174.1	181.8
15	0	154.3	156.1	160.9	169.0	177.0	181.8	183.6	153.4	161.2	169.0	176.8	184.6
15	6	156.5	158.3	163.1	171.1	179.2	184.0	185.8	155.5	163.3	171.1	178.9	186.8
16	0	158.3	160.1	164.8	172.9	181.0	185.7	187.5	157.4	165.1	172.9	180.7	188.4
16	6	159.7	161.5	166.2	174.2	182.2	186.9	188.7	158.8	166.5	174.2	181.9	189.7
17	0	160.8	162.6	167.2	175.2	183.1	187.7	189.5	159.9	167.5	175.2	182.8	190.4
17	6	161.5	163.3	167.9	175.8	183.6	188.2	190.0	160.6	168.2	175.8	183.3	190.9
18	0	162.1	163.9	168.4	176.1	183.9	188.4	190.2	161.2	168.7	176.1	183.6	191.1
18	6	162.5	164.2	168.7	176.4	184.0	188.5	190.3	161.6	169.0	176.4	183.8	191.1
19	0	162.8	164.5	169.0	176.5	184.1	188.5	190.3	161.9	169.2	176.5	183.8	191.1
						KIZ							
5	6	102.9	104.1	107.1	112.2	117.3	120.3	121.5	102.3	107.2	112.2	117.1	122.0
6	0	105.5	106.7	109.8	115.1	120.4	123.5	124.8	104.9	110.0	115.1	120.2	125.4
6	6	108.0	109.3	112.5	118.0	123.5	126.7	127.9	107.4	112.7	118.0	123.3	128.6
7	0	110.5	111.8	115.1	120.8	126.5	129.8	131.1	109.9	115.3	120.8	126.3	131.7
7	6	113.1	114.4	117.8	123.7	129.5	132.9	134.3	112.4	118.0	123.7	129.3	134.9
8	0	115.7	117.0	120.5	126.6	132.6	136.1	137.5	115.0	120.8	126.6	132.4	138.2
8	6	118.3	119.7	123.3	129.5	135.7	139.3	140.7	117.6	123.5	129.5	135.5	141.4
9	0	121.0	122.4	126.2	132.5	138.8	142.5	144.0	120.3	126.4	132.5	138.6	144.7
9	6	123.8	125.2	129.1	135.5	142.0	145.8	147.3	123.0	129.3	135.5	141.8	148.1
10	0	126.6	128.1	132.0	138.6	145.3	149.2	150.7	125.8	132.2	138.6	145.0	151.4
10	6	129.5	131.1	135.0	141.8	148.6	152.5	154.1	128.7	135.3	141.8	148.3	154.8
11	0	132.5	134.1	138.1	145.0	151.9	155.9	157.5	131.7	138.3	145.0	151.6	158.3
11	6	135.5	137.1	141.2	148.2	155.2	159.3	160.9	134.7	141.4	148.2	154.9	161.7
12	0	138.4	140.0	144.1	151.2	158.3	162.5	164.1	137.6	144.4	151.2	158.1	164.9
12	6	141.0	142.6	146.8	154.0	161.2	165.4	167.0	140.2	147.1	154.0	160.9	167.8
13	0	143.3	145.0	149.2	156.4	163.6	167.8	169.4	142.5	149.4	156.4	163.3	170.3
13	6	145.2	146.9	151.1	158.3	165.5	169.7	171.4	144.4	151.3	158.3	165.3	172.2
14	0	146.7	148.4	152.6	159.8	167.0	171.2	172.8	145.9	152.8	159.8	166.7	173.7
14	6	147.9	149.5	153.7	160.9	168.1	172.3	173.9	147.1	154.0	160.9	167.8	174.7
15	0	148.7	150.4	154.5	161.7	168.8	173.0	174.6	147.9	154.8	161.7	168.5	175.4
15	6	149.3	150.9	155.1	162.2	169.3	173.4	175.0	148.5	155.4	162.2	169.0	175.9
16	0	149.8	151.4	155.5	162.5	169.6	173.7	175.3	148.9	155.7	162.5	169.3	176.1
16	6	150.0	151.6	155.7	162.7	169.7	173.8	175.4	149.2	156.0	162.7	169.5	176.2
17	0	150.3	151.8	155.9	162.9	169.8	173.9	175.4	149.5	156.2	162.9	169.5	176.2
17	6	150.5	152.0	156.1	163.0	169.9	173.9	175.5	149.7	156.3	163.0	169.6	176.3
18	0	150.6	152.2	156.2	163.1	169.9	173.9	175.5	149.8	156.5	163.1	169.7	176.3
18	6	150.8	152.3	156.3	163.1	169.9	173.9	175.5	150.0	156.6	163.1	169.7	176.3
19	0	150.9	152.4	156.4	163.2	169.9	173.9	175.5	150.1	156.6	163.2	169.7	176.2

Ek-4 Yaşa göre Beden Kitle İndeksi (5-19 Yaş- Erkek ve Kız)-WHO, 2007

Yıl	Ay	3.	5.	15.	50.	85.	95.	97.	-2SD	-1SD	Medyan	+1SD	+2SD
						ERKEK							
5	6	13.1	13.4	14.0	15.3	16.7	17.7	18.1	13.0	14.1	15.3	16.7	18.4
6	0	13.2	13.4	14.0	15.3	16.8	17.9	18.3	13.0	14.1	15.3	16.8	18.5
6	6	13.2	13.4	14.1	15.4	16.9	18.0	18.5	13.1	14.1	15.4	16.9	18.7
7	0	13.3	13.5	14.2	15.5	17.1	18.3	18.8	13.1	14.2	15.5	17.0	19.0
7	6	13.3	13.6	14.3	15.6	17.3	18.5	19.0	13.2	14.3	15.6	17.2	19.3
8	0	13.4	13.7	14.4	15.7	17.5	18.8	19.4	13.3	14.4	15.7	17.4	19.7
8	6	13.5	13.8	14.5	15.9	17.7	19.1	19.7	13.4	14.5	15.9	17.7	20.1
9	0	13.6	13.9	14.6	16.0	18.0	19.5	20.1	13.5	14.6	16.0	17.9	20.5
9	6	13.7	14.0	14.7	16.2	18.3	19.8	20.5	13.6	14.8	16.2	18.2	20.9
10	0	13.9	14.1	14.9	16.4	18.6	20.2	21.0	13.7	14.9	16.4	18.5	21.4
10	6	14.0	14.3	15.1	16.7	18.9	20.7	21.5	13.9	15.1	16.7	18.8	21.9
11	0	14.2	14.5	15.3	16.9	19.3	21.1	22.0	14.1	15.3	16.9	19.2	22.5
11	6	14.4	14.7	15.5	17.2	19.6	21.6	22.5	14.2	15.5	17.2	19.5	23.0
12	0	14.6	14.9	15.7	17.5	20.1	22.1	23.1	14.5	15.8	17.5	19.9	23.6
12	6	14.8	15.1	16.0	17.9	20.5	22.6	23.6	14.7	16.1	17.9	20.4	24.2
13	0	15.1	15.4	16.3	18.2	20.9	23.1	24.2	14.9	16.4	18.2	20.8	24.8
13	6	15.4	15.7	16.6	18.6	21.4	23.7	24.8	15.2	16.7	18.6	21.3	25.3
14	0	15.6	16.0	16.9	19.0	21.9	24.2	25.3	15.5	17.0	19.0	21.8	25.9
14	6	15.9	16.3	17.3	19.4	22.4	24.7	25.8	15.7	17.3	19.4	22.2	26.5
15	0	16.2	16.5	17.6	19.8	22.8	25.2	26.4	16.0	17.6	19.8	22.7	27.0
15	6	16.4	16.8	17.9	20.1	23.2	25.7	26.8	16.3	18.0	20.1	23.1	27.4
16	0	16.7	17.1	18.2	20.5	23.7	26.1	27.3	16.5	18.2	20.5	23.5	27.9
16	6	16.9	17.3	18.5	20.8	24.0	26.5	27.7	16.7	18.5	20.8	23.9	28.3
17	0	17.1	17.5	18.7	21.1	24.4	26.9	28.0	16.9	18.8	21.1	24.3	28.6
17	6	17.3	17.7	18.9	21.4	24.7	27.2	28.4	17.1	19.0	21.4	24.6	29.0
18	0	17.5	17.9	19.2	21.7	25.0	27.5	28.6	17.3	19.2	21.7	24.9	29.2
18	6	17.6	18.1	19.4	22.0	25.3	27.8	28.9	17.4	19.4	22.0	25.2	29.5
19	0	17.8	18.2	19.5	22.2	25.6	28.1	29.1	17.6	19.6	22.2	25.4	29.7
						KIZ							
5	6	12.8	13.1	13.8	15.2	17.0	18.2	18.7	12.7	13.9	15.2	16.9	19.0
6	0	12.8	13.1	13.8	15.3	17.1	18.4	18.9	12.7	13.9	15.3	17.0	19.2
6	6	12.8	13.1	13.8	15.3	17.2	18.6	19.2	12.7	13.9	15.3	17.1	19.5
7	0	12.9	13.1	13.9	15.4	17.4	18.8	19.4	12.7	13.9	15.4	17.3	19.8
7	6	12.9	13.2	14.0	15.5	17.6	19.1	19.8	12.8	14.0	15.5	17.5	20.1
8	0	13.0	13.3	14.1	15.7	17.8	19.4	20.2	12.9	14.1	15.7	17.7	20.6
8	6	13.1	13.4	14.2	15.9	18.1	19.8	20.6	13.0	14.3	15.9	18.0	21.0
9	0	13.3	13.6	14.4	16.1	18.4	20.2	21.1	13.1	14.4	16.1	18.3	21.5
9	6	13.4	13.7	14.6	16.3	18.8	20.7	21.6	13.3	14.6	16.3	18.7	22.0
10	0	13.6	13.9	14.8	16.6	19.1	21.1	22.1	13.5	14.8	16.6	19.0	22.6
10	6	13.8	14.1	15.0	16.9	19.5	21.6	22.6	13.7	15.1	16.9	19.4	23.1
11	0	14.0	14.4	15.3	17.2	20.0	22.2	23.2	13.9	15.3	17.2	19.9	23.7
11	6	14.3	14.6	15.6	17.6	20.4	22.7	23.8	14.1	15.6	17.6	20.3	24.3
12	0	14.6	14.9	15.9	18.0	20.9	23.3	24.4	14.4	16.0	18.0	20.8	25.0
12	6	14.8	15.2	16.2	18.4	21.4	23.9	25.0	14.7	16.3	18.4	21.3	25.6
13	0	15.1	15.5	16.5	18.8	21.9	24.4	25.6	14.9	16.6	18.8	21.8	26.2
13	6	15.4	15.8	16.9	19.2	22.4	25.0	26.1	15.2	16.9	19.2	22.3	26.8
14	0	15.6	16.0	17.2	19.6	22.9	25.5	26.7	15.4	17.2	19.6	22.7	27.3
14	6	15.9	16.3	17.4	19.9	23.3	25.9	27.1	15.7	17.5	19.9	23.1	27.8
15	0	16.1	16.5	17.7	20.2	23.7	26.3	27.6	15.9	17.8	20.2	23.5	28.2
15	6	16.2	16.7	17.9	20.5	24.0	26.7	27.9	16.0	18.0	20.5	23.8	28.6
16	0	16.4	16.8	18.1	20.7	24.2	27.0	28.2	16.2	18.2	20.7	24.1	28.9
16	6	16.5	16.9	18.2	20.9	24.5	27.2	28.4	16.3	18.3	20.9	24.3	29.1
17	0	16.6	17.0	18.3	21.0	24.7	27.4	28.6	16.4	18.4	21.0	24.5	29.3
17	6	16.6	17.1	18.4	21.2	24.8	27.5	28.8	16.4	18.5	21.2	24.6	29.4
18	0	16.7	17.1	18.5	21.3	24.9	27.7	28.9	16.4	18.6	21.3	24.8	29.5
18	6	16.7	17.2	18.5	21.3	25.0	27.7	29.0	16.5	18.6	21.3	24.9	29.6
19	0	16.7	17.2	18.6	21.4	25.1	27.8	29.0	16.5	18.7	21.4	25.0	29.7

EK 5

Table 1. Weight in kilograms for children and adolescents from birth through 19 years of age by sex and age, by mean, standard error of the mean, and selected percentiles: United States, 2003–2006

Sex and age[1]	Number examined	Mean	Standard error	Percentile								
				5th	10th	15th	25th	50th	75th	85th	90th	95th
Male				Kilograms								
Birth to 2 months	101	5.2	0.12	*	*	4.2	4.6	5.2	5.9	6.3	*	*
3–5 months	139	7.3	0.08	*	6.2	6.4	6.7	7.2	7.8	8.0	8.2	*
6–8 months	130	8.4	0.13	*	6.8	7.2	7.6	8.4	9.1	9.5	9.9	*
9–11 months	124	9.7	0.15	*	*	8.6	8.9	9.7	10.4	10.6	*	*
1 year	360	11.6	0.12	8.9	9.2	9.8	10.5	11.5	12.6	13.3	13.8	14.4
2 years	292	14.1	0.14	11.3	12.0	12.3	12.8	13.9	15.1	15.8	16.4	16.9
3 years	210	15.8	0.16	*	13.4	13.6	14.2	15.3	17.1	18.1	18.7	*
4 years	208	18.6	0.31	*	15.2	15.5	16.2	18.1	20.0	21.3	22.7	*
5 years	202	22.1	0.49	*	17.4	18.1	18.9	21.0	23.5	25.2	26.9	*
6 years	176	24.2	0.33	*	19.5	20.0	20.9	23.7	26.2	27.6	29.5	*
7 years	181	26.6	0.58	*	19.6	21.0	22.4	25.6	29.6	32.3	33.9	*
8 years	151	31.4	0.90	*	23.4	24.2	25.3	29.0	34.3	38.3	41.9	*
9 years	176	34.6	0.71	*	25.8	26.6	28.2	32.3	39.4	42.5	44.1	*
10 years	172	40.1	0.86	*	28.4	29.7	31.7	37.3	45.1	53.6	56.8	*
11 years	158	46.8	1.62	*	33.2	34.1	35.5	44.2	54.0	63.3	67.0	*
12 years	275	50.8	1.23	32.0	35.9	37.0	39.5	46.9	57.3	65.1	72.8	82.9
13 years	284	57.8	1.37	35.9	39.4	41.9	43.9	55.6	64.4	73.5	81.0	90.9
14 years	260	63.1	1.73	42.5	43.9	47.2	51.4	59.8	70.7	76.5	84.3	99.1
15 years	270	70.2	1.36	48.5	52.4	55.0	58.2	66.3	76.9	84.7	89.9	100.4
16 years	308	76.1	1.50	53.4	55.3	57.9	61.5	70.7	88.5	96.3	101.9	116.1
17 years	279	75.0	1.30	54.1	56.7	58.6	60.9	70.6	84.2	92.0	101.3	111.0
18 years	283	77.2	1.67	53.7	57.2	59.4	64.0	72.7	83.7	97.8	105.8	110.4
19 years	271	80.2	1.60	54.3	58.1	61.2	64.7	76.5	92.9	99.6	107.3	117.3
Female												
Birth to 2 months	81	4.9	0.10	*	*	*	4.4	4.9	5.4	*	*	*
3–5 months	94	6.8	0.10	*	*	*	6.2	6.6	7.3	*	*	*
6–8 months	122	8.1	0.13	*	*	7.1	7.3	8.0	8.8	9.2	*	*
9–11 months	126	9.2	0.11	*	*	8.0	8.2	9.0	10.0	10.3	*	*
1 year	328	10.9	0.11	8.4	8.8	9.1	9.9	10.9	11.9	12.5	13.0	13.4
2 years	335	13.4	0.13	10.2	10.7	11.2	12.1	13.1	14.4	15.4	16.1	16.8
3 years	191	15.8	0.20	*	12.8	13.4	14.1	15.5	16.8	17.8	18.5	*
4 years	226	17.9	0.21	*	14.8	15.2	16.1	17.5	19.4	20.2	20.8	*
5 years	199	20.5	0.37	*	15.9	16.9	17.6	19.6	22.1	24.4	25.5	*
6 years	193	23.4	0.49	*	18.4	19.1	19.9	22.1	25.3	27.4	29.7	*
7 years	157	27.3	0.62	*	21.1	21.7	23.9	25.7	29.7	33.6	35.5	*
8 years	184	30.7	0.94	*	22.3	23.5	25.0	28.2	33.9	39.1	42.1	*
9 years	185	36.7	0.99	*	26.2	27.8	29.6	34.0	42.0	46.7	50.7	*
10 years	189	42.4	1.07	*	29.1	30.7	32.5	40.5	49.0	55.5	58.5	*
11 years	175	49.2	1.31	*	33.3	34.8	38.0	47.3	56.7	62.4	68.2	*
12 years	249	52.9	1.31	*	36.4	40.4	43.6	49.5	59.7	67.4	76.2	*
13 years	292	57.4	0.98	36.8	41.2	43.0	47.1	54.4	63.4	72.6	76.0	88.5
14 years	269	58.8	1.75	*	44.0	45.8	48.5	54.4	64.8	75.8	81.0	*
15 years	248	60.9	0.76	*	46.5	47.6	50.7	57.6	67.6	76.7	81.0	*
16 years	253	61.5	0.95	*	47.2	49.5	53.2	58.8	67.0	71.5	79.6	*
17 years	252	66.0	1.66	*	49.1	51.4	54.1	60.6	71.9	79.7	87.3	*
18 years	272	67.6	2.15	*	47.8	49.7	54.6	63.0	76.2	86.2	92.1	*
19 years	239	67.4	1.79	*	50.9	52.8	55.3	63.0	73.6	84.3	92.7	*

* Figure does not meet standards of reliability or precision.
[1]Age shown is age at time of examination.

EK 6

Table 7. Height in centimeters for children and adolescents aged 2–19 years by sex and age, by mean, standard error of the mean, and selected percentiles: United States, 2003–2006

Sex and age[1]	Number examined	Mean	Standard error	Percentile								
				5th	10th	15th	25th	50th	75th	85th	90th	95th
Male				Centimeters								
2 years	258	91.9	0.22	*	86.9	88.0	89.2	91.9	94.5	96.2	96.8	*
3 years	209	98.5	0.44	*	92.6	93.3	94.9	98.2	102.1	103.8	105.2	*
4 years	206	107.1	0.44	*	99.9	102.0	104.4	106.8	110.8	111.8	113.9	*
5 years	202	114.4	0.52	*	107.0	108.5	111.4	114.6	117.9	119.6	120.8	*
6 years	176	120.6	0.47	*	114.0	115.7	117.5	120.8	124.0	125.6	127.0	*
7 years	181	124.7	0.75	*	113.5	115.6	120.2	125.2	129.3	131.5	133.1	*
8 years	152	131.1	0.68	*	123.6	124.6	127.1	130.3	134.6	138.0	139.1	*
9 years	176	136.8	0.49	*	129.2	130.3	132.9	137.1	141.4	143.3	143.9	*
10 years	171	142.3	0.77	*	133.0	134.3	136.8	141.5	147.0	149.3	151.3	*
11 years	158	150.0	1.16	*	140.6	141.4	144.4	149.4	156.1	159.8	161.1	*
12 years	275	154.7	0.54	*	145.2	146.5	149.5	153.9	160.3	162.5	164.8	*
13 years	284	161.9	0.87	*	149.7	151.7	154.1	162.2	168.3	171.3	173.5	*
14 years	260	168.7	0.70	*	158.4	159.9	163.1	169.0	174.7	177.5	179.0	*
15 years	270	173.6	0.61	*	163.5	165.4	169.2	174.8	178.0	180.2	182.0	*
16 years	308	175.9	0.66	164.2	166.9	167.8	170.4	176.0	180.2	183.8	186.9	188.7
17 years	278	176.6	0.49	*	167.5	168.7	171.2	176.8	181.7	183.4	185.2	*
18 years	284	176.8	0.54	*	167.1	169.5	172.4	176.4	181.3	183.5	186.3	*
19 years	271	176.7	0.91	*	165.3	168.0	170.8	177.4	182.5	185.5	186.6	*
Female												
2 years	285	90.2	0.39	*	84.0	84.8	87.2	90.2	93.2	94.5	95.6	*
3 years	187	98.3	0.35	*	91.9	93.7	95.9	98.1	101.5	102.8	104.1	*
4 years	225	105.2	0.40	*	99.2	100.6	101.9	105.2	107.9	110.4	111.9	*
5 years	199	112.2	0.54	*	105.2	105.8	107.4	111.7	116.6	119.0	119.6	*
6 years	193	119.0	0.53	*	112.7	113.3	114.8	118.2	122.8	125.7	127.6	*
7 years	157	125.8	0.77	*	118.0	119.3	121.4	125.6	129.3	131.5	133.1	*
8 years	184	131.3	0.54	*	123.3	124.3	126.8	130.5	135.2	137.9	138.7	*
9 years	185	138.6	0.70	*	130.2	131.4	133.4	138.3	143.7	146.0	147.1	*
10 years	189	144.2	0.73	*	135.0	136.9	138.6	143.7	148.7	151.3	152.8	*
11 years	174	151.3	0.69	*	141.1	143.8	146.2	151.4	156.9	159.9	161.3	*
12 years	249	156.7	0.55	*	148.3	149.4	152.0	156.7	160.8	164.0	166.6	*
13 years	292	158.6	0.62	147.1	150.0	151.2	153.8	157.7	163.0	166.5	167.9	170.5
14 years	270	160.5	0.58	*	150.7	152.3	155.7	161.0	165.0	167.5	169.3	*
15 years	254	162.1	0.60	*	154.3	155.9	158.4	162.0	165.8	168.5	170.1	*
16 years	261	162.9	0.58	*	153.6	154.7	157.0	162.8	168.7	171.5	172.4	*
17 years	275	162.2	0.41	*	155.6	157.0	158.5	162.2	166.2	168.0	169.2	*
18 years	304	163.0	0.49	151.9	154.7	156.1	158.4	162.8	167.6	169.8	171.1	173.3
19 years	267	163.1	0.58	*	153.1	155.4	158.1	163.3	168.0	170.3	172.4	*

* Figure does not meet standards of reliability or precision.

[1]Age shown is age at time of examination.

EK 7

Table 13. Body mass index values for children and adolescents aged 2–19 years by sex and age, by mean, standard error of the mean, and selcted percentiles: United States 2003–2006

Sex and age[1]	Number examined	Mean	Standard error	Percentile								
				5th	10th	15th	25th	50th	75th	85th	90th	95th
Male				Body mass index								
2 years	258	16.8	0.10	15.1	15.3	15.6	15.8	16.6	17.6	18.1	18.3	19.2
3 years	209	16.2	0.11	*	14.5	14.8	15.3	16.2	16.9	17.2	17.6	*
4 years	206	16.2	0.14	*	14.1	14.3	14.8	16.0	16.9	17.7	18.4	*
5 years	202	16.8	0.25	*	14.2	14.5	14.9	16.0	17.5	18.5	19.5	*
6 years	176	16.5	0.15	*	14.2	14.7	15.0	16.1	17.4	18.7	19.1	*
7 years	181	16.9	0.24	*	14.3	14.7	15.1	16.2	17.6	19.3	20.0	*
8 years	151	18.1	0.35	*	14.6	15.0	15.5	17.2	19.1	20.8	22.5	*
9 years	176	18.4	0.34	*	14.7	15.1	15.7	17.3	20.3	21.6	22.7	*
10 years	171	19.6	0.33	*	15.5	15.7	16.5	18.0	21.8	24.4	26.0	*
11 years	158	20.5	0.54	*	15.9	16.5	16.9	18.3	22.8	26.6	27.4	*
12 years	275	21.0	0.44	15.2	16.0	16.6	17.3	19.7	23.2	25.8	28.1	31.8
13 years	284	21.8	0.40	15.7	16.8	17.3	17.8	20.8	24.0	25.9	28.5	31.5
14 years	260	22.0	0.51	16.4	17.2	17.5	18.5	20.9	23.8	26.4	29.1	32.4
15 years	270	23.2	0.36	17.7	17.9	18.7	19.7	21.9	25.0	27.7	30.5	31.6
16 years	308	24.5	0.43	17.5	18.9	19.4	20.3	22.6	27.7	30.6	32.7	35.5
17 years	278	24.0	0.45	18.3	18.8	19.0	20.0	22.4	26.7	29.4	31.3	34.0
18 years	283	24.6	0.54	17.7	19.0	19.6	20.9	23.1	27.5	30.2	31.7	36.3
19 years	271	25.6	0.53	18.4	19.3	20.1	21.6	24.2	28.6	31.7	34.0	36.4
Female												
2 years	285	16.6	0.11	*	14.7	15.1	15.4	16.3	17.4	18.3	18.7	*
3 years	187	16.3	0.18	*	14.5	14.8	15.1	15.9	16.9	18.0	19.0	*
4 years	224	16.1	0.14	*	14.3	14.6	15.0	15.8	16.7	17.1	18.0	*
5 years	199	16.2	0.19	*	14.3	14.5	14.9	15.5	16.9	18.1	18.9	*
6 years	193	16.4	0.21	*	14.1	14.5	14.8	15.9	17.3	18.4	19.4	*
7 years	157	17.1	0.26	*	14.4	14.8	15.2	16.4	18.2	19.6	20.5	*
8 years	184	17.6	0.42	*	14.2	14.6	15.1	16.6	18.7	21.5	22.8	*
9 years	185	18.9	0.36	*	15.1	15.5	15.9	18.1	21.1	22.6	24.4	*
10 years	189	20.2	0.40	*	15.3	15.7	16.5	19.3	22.4	25.7	26.9	*
11 years	174	21.3	0.47	*	15.9	16.3	17.6	20.6	23.9	26.1	28.4	*
12 years	249	21.4	0.45	*	15.5	16.9	18.0	20.0	23.1	27.5	29.0	*
13 years	292	22.7	0.35	*	17.0	17.8	18.9	21.4	25.8	28.1	30.1	*
14 years	269	22.8	0.62	*	17.7	18.1	18.6	21.2	25.2	28.9	31.0	*
15 years	247	23.2	0.28	*	18.3	18.7	19.7	22.1	25.8	27.3	29.4	*
16 years	253	23.2	0.39	*	18.5	19.1	20.1	21.5	25.0	27.4	30.1	*
17 years	252	25.0	0.60	*	19.1	19.5	20.7	22.9	27.4	30.8	32.7	*
18 years	271	25.4	0.80	*	18.5	19.1	20.7	23.5	28.2	33.1	34.7	*
19 years	238	25.3	0.64	*	19.6	20.1	21.1	23.6	27.4	31.1	33.7	*

* Figure does not meet standards of reliability or precision.

[1]Age shown is age at time of examination.

NOTE: Pregnant females were excluded. Body mass index (BMI) is calculated as follows: BMI = weight(kilograms)/height(meters^2).

ETİK KURUL

YEDİTEPE ÜNİVERSİTESİ HASTANESİ	YEDİTEPE ÜNİVERSİTESİ KLİNİK ARAŞTIRMALAR ETİK KURULU KARAR FORMU

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BAŞVURU BİLGİLERİ	ARAŞTIRMANIN AÇIK ADI	Beslenme Danışmanlığı Alan Çocuk ve Ergen Yüzücülerin Beslenme Durumlarının ve Danışmanlık Sonrası Vücut Bileşimlerinin Değişiminin İncelenmesi			
	ARAŞTIRMA PROTOKOLÜNÜN KODU				
	EUDRACT NUMARASI				
	SORUMLU ARAŞTIRMACI ÜNVANI/ADI/SOYADI	Prof.Dr.Serdar Öztezcan Diyetisyen Aysen Arıcan			
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	ARAŞTIRMA MERKEZİNİN AÇIK ADRESİ	DİYETİSYEN AYSEN ARICAN'IN OFİSİ			
	DESTEKLEYİCİ VE AÇIK ADRESİ	**YOK**			
	DESTEKLEYİCİNİN YASAL TEMSİLCİSİ VE ADRESİ	**YOK**			
	UZMANLIK TEZİ/AKADEMİK AMAÇLI	UZMANLIK TEZİ ☒	AKADEMİK AMAÇLI ☐		
	ARAŞTIRMANIN FAZI VE TÜRÜ	FAZ 1 ☐			
		FAZ 2 ☐			
		FAZ 3 ☐			
		FAZ 4 ☐			
		BE/BY ☐			
		DİĞER ☐	Diğer ise belirtiniz:		
		İLAÇ DIŞI ARAŞTIRMA ☒	Belirtiniz:Retrospektif çalışma		
	ARAŞTIRMAYA KATILAN MERKEZLER	TEK MERKEZ ☒	ÇOK MERKEZLİ ☐	ULUSAL ☒	ULUSLARARASI ☐

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DEĞERLENDİRİLEN BELGELER	ARAŞTIRMA PROTOKOLÜ			Türkçe ☒ İngilizce ☐ Diğer ☐
	ARAŞTIRMA BROŞÜRÜ			Türkçe ☐ İngilizce ☐ Diğer ☐
	BİLGİLENDİRİLMİŞ GÖNÜLLÜ OLUR FORMU			Türkçe ☐ İngilizce ☐ Diğer ☐
	OLGU RAPOR FORMU			Türkçe ☒ İngilizce ☐ Diğer ☐

	Belge Adı		Açıklama
DEĞERLENDİRİLEN DİĞER BELGELER	ARAŞTIRMA BÜTÇESİ	☐	
	SİGORTA	☐	

YEDİTEPE ÜNİVERSİTESİ HASTANESİ

YEDİTEPE ÜNİVERSİTESİ KLİNİK ARAŞTIRMALAR ETİK KURULU KARAR FORMU

	HASTA KARTI/GÜNLÜKLERİ	☐	
	İLAN	☐	
	YILLIK BİLDİRİM	☐	
	SONUÇ RAPORU	☐	
	GÜVENLİLİK BİLDİRİMLERİ	☐	
	DİĞER	☐	

KARAR BİLGİLERİ	**Karar No:** 423	**Tarih:22.04.2014**
	Prof.Dr.Serdar Öztezcan ve Diyetisyen Aysen Arıcan sorumluluğunda yapılması tasarlanan ve yukarıda başvuru bilgileri verilen klinik araştırma başvuru dosyası ve ilgili belgeler araştırmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş, gerçekleştirilmesinde etik bir sakınca bulunmadığına toplantıya katılan etik kurulu üyelerinin oy çokluğu ile karar verilmiştir.	

ETİK KURULU BİLGİLERİ

ÇALIŞMA ESASI	Klinik Araştırmalar Hakkında Yönetmelik, İyi Klinik Uygulamaları Kılavuzu, Yeditepe Üniversitesi Tıp Fakültesi, Klinik Araştırmalar Etik Kurulu Kuruluş ve Çalışma Esasları.

ETİK KURUL BAŞKANI UNVANI/ADI/SOYADI: Prof. Dr. R. Serdar ALPAN

ETİK KURULU ÜYELERİ

Unvanı/Adı/Soyadı	Uzmanlık Alanı	Kurumu	Cinsiyet		İlişki *		Katılım **		İmza
Prof. Dr. R. Serdar Alpan	Farmakoloji	YÜTF	E ☒	K ☐	E ☐	H ☐	E ☐	H ☐	
Prof. Dr. M. Reha Cengizlier	Pediatri	YÜTF	E ☒	K ☐	E ☐	H ☒	E ☒	H ☐	
Prof. Dr. Serdar Öztezcan	Biyokimya	YÜTF	E ☒	K ☐	E ☐	H ☐	E ☐	H ☐	
Doç. Dr. Baki Ekçi	Genel Cerrahi	YÜTF	E ☒	K ☐	E ☐	H ☐	E ☐	H ☐	
Prof. Dr. Ferda Özkan	Patoloji	YÜTF	E ☐	K ☒	E ☐	H ☒	E ☒	H ☐	
Prof. Dr. Nural Bekiroğlu	Biyoistatistik	MÜTF	E ☐	K ☒	E ☐	H ☐	E ☐	H ☐	
Doç. Dr. Esra Can Say	Diş Has. Ted.	YÜDF	E ☐	K ☒	E ☐	H ☒	E ☒	H ☐	
Doç. Dr. Meriç Köksal	Eczacılık	YÜEF	E ☐	K ☒	E ☐	H ☒	E ☒	H ☐	
Prof. Dr. Ali Rıza Okur	Hukuk	YÜHF	E ☒	K ☐	E ☐	H ☒	E ☒	H ☐	
Prof.Dr. Başar Atalay	Beyin Cerrahi	YÜTF	E ☒	K ☐	E ☐	H ☒	E ☒	H ☐	
Doç.Dr.Nesrin Sanman	Göğüs Hastalıkları	MÜTF	E ☐	K ☒	E ☐	H ☒	E ☒	H ☐	
Yrd.Doç.Dr.Esin Öztürk Işık	Biyomedikal Mühendisi	YÜTF	E ☐	K ☒	E ☐	H ☒	E ☒	H ☐	
Yakut Gümüşlügil	Sivil Üye		E ☐	K ☒	E ☐	H ☐	E ☐	H ☐	

* : Araştırma ile İlişki
** : Toplantıda Bulunma

Önemli Not: Çalışmanızın Klinik Araştırmalar Etik Kurulu tarafından onaylanan protokole göre yürütülmesi ve çalışma protokolündeki değişiklilerin kurulumuza bildirilmesi gerekmektedir.

ÖZGEÇMİŞ

Kişisel Bilgiler

Adı	AYSEN	**Soyadı**	ARICAN ÖZ
Doğ. Yeri	ISPARTA	**Doğ. Tar.**	25.09.1978
Uyruğu	T.C	**TC Kim No**	23255059494
Email	dytaysenarican@gmail.com	**Tel**	05335146860

Eğitim Düzeyi

	Mezun Olduğu Kurumun Adı	**Mez. Yılı**
Doktora	-	-
Yük. Lis.	Yeditepe Üniversitesi	2014
Lisans	Hacettepe Üniversitesi	1999
Lise	Antalya Merkez Gazi Lisesi	1994

İş Deneyimi (Sondan geçmişe doğru sıralayın)

	Görevi	**Kurum**	**Süre (Yıl - Yıl)**
1.	Diyetisyen	Aysen Arıcan Öz Sağlıklı Beslenme Danışmanlığı	2013-devam
2.	Okutman	Yeditepe Üniversitesi Beslenme ve Diyetetik Bölümü (Sporcu Beslenmesi Dersi)	2010-2014

3. Diyetisyen	Özel Beslenme Danışmanlık	2007-2013
4. Diyetisyen	Vakıf Gureba Eğitim ve Araştırma Hastanesi	2000-2007
5. Diyetisyen	OTA SLIM ve NUTRA SLİM Zayıflama Merkezleri	1999-2000

Yabancı Dilleri	**Okuduğunu Anlama***	**Konuşma***	**Yazma***	**KPDS/ÜDS Puanı**	**(Diğer) Puanı**
İngilizce	İyi	Zayıf	Orta		70

***Çok iyi, iyi, orta, zayıf olarak değerlendirin

	Sayısal	**Eşit Ağırlık**	**Sözel**
ALES Puanı	57,14229	59,01502	74,004405
(Diğer) Puanı			

Bilgisayar Bilgisi

Program	**Kullanma becerisi**
Microsoft Office excel-word-power point-outlook	Çok iyi
BEBİS- Beslenme Bilgi Sistemi	Çok iyi
Windows uygulamaları	Çok iyi