T.C.
YEDİTEPE UNIVERSITY
INSTITUTION OF HEALTH SCIENCES
NUTRITION AND DIETETICS

MASTER THESIS

EXPLORATION OF THE NUTRITIONAL STATUS AND BEHAVIOURS OF SOME OVERWEIGHT AND OBESE CHILDREN WITH AUTISM SPECTRUM DISORDER IN ISTANBUL AND THE REASONS OF HIGH BODY-MASS INDICES IN THESE CHILDREN

AYŞE HÜMEYRA BİÇER

THESIS ADVISOR
PROF.DR. SERDAR ÖZTEZCAN

İSTANBUL, 2014

YEDITEPE UNIVERSITY

Yüksek Lisans (Master) öğrencisi Ayşe Hümeyra Biçer'in çalışması jürimiz tarafından Beslenme ve Diyetetik Anabilim Dalı Master tezi olarak uygun görülmüştür.

İMZA

Başkan : Prof. Dr. Serdar ÖZTEZCAN (Danışman)
Üniversite : Yeditepe Üniversitesi .....

Üye :Yrd. Doç. Dr. Arzu DURUKAN
Üniversite : Yedtepe Üniversitesi .....

Üye :Yrd. Doç. Dr. Aylin ALSAFFAR
Üniversite : Özyeğin Üniversitesi .....

ONAY

Yukarıdaki jüri kararı Enstitü Yönetim Kurulu'nun 11.09.2014.. tarih ve 2014/20-2.. sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Müdür

ASSERTION

I declare that this dissertation hereby submitted to Yeditepe University for the degree of Master of Nutrition and Dietetics has not previously been submitted by me for a degree at this or any other university.

All information in this document has been obtained and presented in accordance with academic rules and ethical conduct.

I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Ayşe Hümeyra BİÇER

ACKNOWLEDGEMENTS

This thesis would not have been possible without the support of many people.

I wish to express my gratitude to my advisor, Prof.Dr. Serdar ÖZTEZCAN who was abundantly helpful and offered invaluable assistance, support and guidance.

I also thank to Assist.Prof. A. Aylin ALSAFFAR for her guidance.

Furthermore, I would like to thank Soner BİLGİÇ for his encouragement and helping me with the tables and graphics.

Special thanks also to my best friend Aslıhan SOYSAL for helping me at all stages of my thesis and her endless support.

I wish to thank TODEV (Türkiye Otistiklere Destek ve Eğitim Vakfı) for allowing me to conduct this study and their support during data collection.

Where would I be without my family? I convey special acknowledgement to my family, especially to my mother, Aysel BİÇER, for her enormous encouragement, being with me and helping me out from beginning to the end.

Last but by no means the least, I thank to my brother with autism spectrum disorder (ASD), Muhammed Emin BİÇER who had convinced me that a study about “autism” would be unique and I think he is unique.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS / ABBREVIATIONS

ASD	Autism Spectrum Disorder
BMI	Body Mass Index
DRI	Dietary Reference Intake
DSM	Diagnostic and Statistical Manual
WHO	World Health Organization
FAS	Feeding Assessment Survey
IPAQ	International Physical Activity Questionnaire
METs	Estimated Metabolic Equivalent
SPSS	Statistical Package for Social Sciences
DRI	Dietary Reference Intakes
EAR	Estimated Average Requirement
AI	Adequate Intake
UL	Tolerable Upper Intake Level
OB	Obese
OW	Overweight
PhD	Doctor of Philosophy
AED	Antiepileptic Drug
GFCF	Gluten-free, Casein-free
FFQ	Food Frequency Questionnaire
mm	Millimetre
kcal	Kilo-calorie
g	Gram
mg	Miligram
µg	Microgram
TL	Turkish Lira
kg	Kilogram

ABSTRACT

This study was performed to determine the nutritional status of children with autism spectrum disorder (ASD) whose body mass indices (BMIs) were over 25.0 and explore the reasons of overweight and obese in these children.

80 individuals (aged between 12 – 18, males) with ASD were selected randomly after some anthropometric measurements (weight and height) were taken and their BMIs were calculated (BMIs over 25.0 were taken for the study). A total number of 80 individuals' parents/caretakers completed 4 questionnaires which are; General Questionnaire, Three Day Food Record, Feeding Assessment Survey (FAS) and International Physical Activity Questionnaire (IPAQ).

Anthropometric measurements showed that 25 of the children were overweight and 55 of the children were obese.

According to the results of three day food records, children's fibre, calcium and vitamin D intakes were inadequate and their cholesterol levels were found higher than normal limits.

The results of feeding assessment survey revealed that the main feeding problems are: refuses to swallow/holds food in mouth (5 children), refuses to eat (3 children) and difficulty swallowing (1 child). Another major feeding problem is selectivity and 36,3% (29 children) of the children have selectivities. Most positively or negavitely selected foods are breads (10,3%), fruits (10,3%) and dairy products (17,2%).

Drug usage showed that 29 children (36,3%) use drugs and 16 of them (57,1%) use antipsychotics and 16 of them (57,1%) use antiepileptics.

Depending on the international physical activity questionnaire; 71 children (89%) had moderate physical activity level, 9 children (11%) had low physical activity level and none of the children had high physical activity level.

1. INTRODUCTION

Autism Spectrum Disorder (ASD) falls under the broad diagnostic category of "Pervasive Developmental Disorders" and is marked by impairments in communication, forming relationships/social interaction, and often behavioral control usually appears before the age of 3 years [1]. Along with these core features, there are a host of additional associated impairments including inattention, impulsivity, challenging behaviors, feeding problems, and sleep problems [2-5].

Data published in the 1990s indicate the prevalence of autism spectrum disorder (ASD) as ranging from 5 to 31 per 10,000 [6-16]. In the 2000s, the prevalence of autism is one in 150 in the world and the prevalence in boys is 3-4 times higher than girls [17]. In the Statistical Health Survey of Turkey (2012), autism spectrum disorder is included in "others" category with mental retardation, learning disabilities, cerebral palsy and congenital dislocation of the hip [18]. The number of individuals with ASD in Turkey is estimated to be approximately 450.000 and 125.000 of them are children aged between 0-14 [19].

The causes of autism are currently unclear, but the condition is believed to have both a genetic and an environmental component. Currently, there is no cure for autism. However, there is a wide range of interventions, i.e. methods for facilitating learning and development that can alleviate autism symptom severity [20].

Because of the clinic symptom characteristic of children with ASD, most studies focused on language, psychology and behaviour and paid much less attention to their body growth and nutritional condition [21].

Previous research suggests children with ASD may be at great risk or even greater risk for overweight and obesity in comparison to their typically developing peers. For example, prevalence data from 1992 to 2003 that were obtained through a chart review methodology indicate that children with ASD have prevalence rates of overweight and obesity slightly higher than the general population, with approximately 36% of children having a BMI over the 85th percentile and 19% of children having a BMI over the 95th percentile [22]. Other studies are needed.

Unique barriers to healthy lifestyles and weight management for children with ASD may be responsible for this high risk of overweight [23]. For instance, children with ASD can

be overly selective, with aversions to specific textures, colors, smells, and temperatures and rigidity with respect to specific brands of foods [24]. Matson, Fodstad, et al. found that 76% of children with ASD in their sample would only eat certain foods (i.e., food selective) and 76% preferred foods of a certain texture and/or smell [25]. In a study of Schreck et al. [26] caretakers reported that children with ASD had more "ritualistic eating behaviours" (i.e. required a specific utensil or food presentation to consume a food, refusal more foods, rejected more foods due to texture) and in general they had more feeding problems [27]. A study carried out with 164 children with ASD aged between 4 – 18, by Bicer and Alsaffar [28] showed that Turkish children with ASD had selective behaviour, fast eating, eating too much and refusal of eating during meal time. Some researchers have asserted that feeding problems could be related to the restricted/repetitive or stereotyped patterns behavior criteria of ASD [29].

Many studies have investigated the dietary contributors to childhood overweight and obesity [30, 31]. Evidence from these studies of typically developing children suggests that dietary contributors to caloric imbalance include increased consumption of sugar-sweetened beverages [32-35], reduced fruit and vegetable intake [31, 36], increased portion sizes, eating more snacks [37].

Parents of children with ASD face a multitude of barriers to getting their child to eat a healthy diet and obtain the recommended amount of physical activity, some of which are specific to children with special needs conditions [23].

Research has produced mixed results regarding the relationship between dietary intake (e.g., consumption of certain food groups) and weight problems in children with ASD [38, 39]. Additionally, minimal research has focused on the relationship between physical activity and overweight specifically in children with ASD, although it has been suggested that barriers to physical activity in this group may be related to elevated risk for obesity [40]. Some deficits in motor abilities may be exacerbated by reduced opportunity to engage in physical activity. Individuals with ASD may suffer impairments in motor skills, are likely to do little exercise, and the potential physical, psychological, and behavioral benefits of increased exercise [41].

For example, Pan [42] compared levels of physical activity during school by elementary students with ASD (n= 23) and those without disabilities (n= 23). In that study, accelerometer measurements indicated that children with ASD were significantly less

active than the comparison group ($p<.01$) [42]. Similarly, Draheim, Williams, and McCubbin [43] reported survey results suggesting that 47–51% of older individuals with intellectual disabilities, including ASD, residing in community settings may be living dangerously sedentary lifestyles.

Another reason of weight-gain in children with ASD is considered as drug usage and the adverse effects of them, especially antipsychotics and antiepileptics (AED). Notable and relatively common adverse effects of antipsychotics include extrapyramidal symptoms (which involve motor control) and hyperprolactinemia (overproduction of prolactin in both men and non-pregnant women) primarily in typicals and weight gain and metabolic abnormalities mostly in atypicals [44].

Greenwood's study (2000) shows the weight gain in typical adults range from 7% to 73% [45] after a treatment with antiepileptics. Weight gain has been associated with a significant increase in BMI [46, 47] and has been reported in children and adults treated with valproate which is an active substance of most of the antiepileptic drugs [46, 48]. Most studies indicate that valproate can be expected to cause weight gain that may result in significant obesity. This seems to be especially likely in older children and adults.

This study was undertaken to determine the weight status of overweight and obese Turkish children with ASD (using body mass index (BMI)-for-age percentiles) and assess their dietary intakes. A secondary purpose was to investigate the reasons of the prevalence of overweight and obesity (feeding habits, nutrient imbalances, lack of physical activity, drug usage, socioeconomic status etc.)

2. MATERIALS AND METHODS

2.1. Participants

Participants in the study comprised 80 children aged 12 to 18. All of the participants were male and the children were divided into two age groups (9 to 13 years and 14 to 18 years) to correspond to the age groups used in Dietary Reference Intake (DRI) tables. Most of the children (65%) were aged between 14 to 18 years; 35% were between 9 to 13 years and 25 (31,3%) of them were overweight and 55 (68,75%) of them were obese.

The participants were randomly selected from different autism rehabilitation centers in Istanbul, Turkey between December 2013 and March 2014. All participants were previously diagnosed with ASD by the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV) by a pediatrician, child neurologist or a child psychiatrist.

Permission to conduct the study was granted by the Ethical Committee of the National Education Directorate of Istanbul and rehabilitation centers.

All parents and caregivers who volunteered to take part in the study gave written informed consent.

2.2. Data Collection

Children (n=80) were weighed and measured in light clothing without shoes using a portable scale (accuracy 50 g; Seca 874, Seca Ltd., Birmingham) and mobile stadiometer (accuracy 1 mm; Seca 217, Seca Ltd., Birmingham). The BMI values were calculated and assessed using BMI-for-age percentile charts by the World Health Organization [49]. The BMI-for-age categories were given as follows: Severely thin < 3rd percentile, Thin 3rd to 15th percentile, Normal 15th to 85th percentile, Overweight 85th to 97th percentile and Obesity > 97th percentile.

In the second part of the study, the parents / caregivers of the children were asked to complete four different questionnaires: general questionnaire, 3-day food record, feeding assessment survey (FAS) and International Physical Activity Questionnaire (IPAQ).

Parents received standardized training by the researcher on food portion sizes before they completed the food records at home. Assistance in completing the questionnaires was available at all times during the study and provided on demand of the parents / caregivers.

2.3. Measures

A general questionnaire, 3-day food record, feeding assessment survey (FAS) and International Physical Activity Questionnaire (IPAQ) were used. General questionnaire was prepared by the researcher. International Physical Activity Questionnaire's short form was obtained from website of IPAQ [50].

2.3.1. General Questionnaire

General questionnaire (Appendix 1) included questions about the education level and occupation of the parents, number of individuals in the family, monthly income and whether market prices affect families' food choices or not.

2.3.2. 3-Day Food Records

Food records were completed during two week days and one weekend day. Parents / caregivers were trained about portion sizes by the help of the portion size catalog (Appendix 2) designed by the researcher. Parents / caregivers could request information or assistance with regard to the completion of the food records at any time during participation.

2.3.3. Feeding Assessment Survey

Feeding assessment survey (Appendix 3) aimed to gather information on the children's behavioral problems about feeding and their daily routine of feeding. Some items in the 'Feeding History Questionnaire' by the Children's Hospital of Philedelphia were used in

the survey (question 1, 3 and 7). Permission to use these items was granted by the Manager of the Pediatric Feeding and Swallowing Centre of the hospital.

2.3.4. IPAQ (International Physical Activity Questionnaire)

IPAQ (Appendix 4) includes questions about the level of physical activity of children and the amount of time they spend during activities. The questionnaire would allow to calculate a METs (Estimated Metabolic Equivalent) point (according to the IPAQ Protocol – Appendix 5) and according to the METs point, the level of the physical activity (Low, Moderate or High) would be identified [51].

2.4. Dietary Assessment

Daily intake values of energy and nutrients (protein, carbohydrate, fibre, sodium, calcium, iron, zinc, phosphorus, iodine, folate, vitamin A, vitamin B6, vitamin B12, vitamin C, vitamin D and sugar) were calculated by using BeBiS software (Beslenme Bilgi Sistemi) and compared with the EAR (Estimated Average Requirement), AI (Average Intake) and UL (Tolerable Upper Intake Level) values (whichever was applicable).

2.5. Statistical Analyses

All analyses were conducted using the Statistical Package for Social Sciences, SPSS (Version 22) (SPSS Inc., Chicago, IL, USA), with statistical significance set at $p<0.05$.

For the evaluation of data descriptive statistical methods (mean, standard deviation) were used and normal distribution of quantitative data between two groups was compared by using Mann – Whitney U test. In order to make comparison between 3 or 4 groups Kruskal – Wallis test was used. For the comparison of qualitative data, Chi – Square test, Continuity Correction (Yates) test and Fisher's exact test were used.

3. RESULTS

3.1. Anthropometric Measurements and Daily Intake of Children

3.1.1. BMI and Percentiles

3.1.2. **Table 3-1.** BMI-for-age Percentile Values of Children with ASD (n=80)

		n	%
Percentile	**85-90**	2	2,5
	90	1	1,3
	90-95	16	20
	95	6	7,5
	>95	55	68,8
Percentile Category	**Overweight**	25	31,3
	Obese	55	68,8

2,5% (n=2) of children were between 85th-90th percentiles, 1,3% (n=1) of children was in the 90th percentile, 20% (n=16) of children were between 90th-95th percentiles, 7,5% (n=6) of children in the 95th percentile and 68,8% (n=55) of children were above the 95th percentile. According to the results; 25 (31.3%) of the children were overweight and 55 (68.6%) of the children were obese.

3.1.3. Daily Intake

Table 3-2. Daily intake of the children with ASD

	Range	**Mean±SD**
Energy (kcal)	1616,9-3922,8	2212,22±345,4
Protein (g)	35,1-144,4	76,7±21,1
Carbohydrate (g)	153,9-469,3	265,12±54,7
Sugar (g)	0-11,9	0,6±2,6
Fat (g)	48,3-162,2	89,24±23,6
Fibre (g)	9,1-62,3	22,74±9,2
Cholesterol (mg)	42-932,9	307,1±196,5
Sodium (mg)	1614,5-14793	4392,31±1763,5
Calcium (mg)	235,4-1827,7	830,52±291,8
Iron (mg)	5,3-102	12,73±10,5
Zinc (mg)	5,5-17,8	10,82±2,8
Phosphorus (mg)	576-2029,4	1221,03±287,5
Iodine (µg)	45,3-422,2	163,72±83,0
Folate (µg)	137-654,3	289,33±86,8
Vitamin A (µg)	194,2-5393	1052,64±737,7
Vitamin B6 (g)	0,7-3	1,51±0,5
Vitamin B12 (µg)	0-9,5	3,73±2,3
Vitamin C (g)	15,4-396,2	116,19±74,5
Vitamin D (µg)	0-6,1	1,6±1,3

Daily energy intakes of children with ASD were ranged between 1616.9 kcal and 3922.8 kcal and the mean value was 2212.2±345.4 kcal.

Daily protein intakes of children with ASD were ranged between 35.1 g and 144.4 g and the mean value was 76.70±21.1 g.

Daily carbohydrate intakes of children with ASD were ranged between 153.9 g and 469.3 g and the mean value was 265.12±54.7 g.

Daily sugar intakes of children with ASD were ranged between 0 g and 11.9 g and the mean value was 0.60±2.6 g.

Daily fat intakes of children with ASD were ranged between 48.3 g and 162.2 g and the mean value was 89.24±23.6 g.

Daily fibre intakes of children with ASD were ranged between 9.1 g and 62.3 g and the mean value was 22.74±9.2 g.

Daily cholesterol intakes of children with ASD were ranged between 42 mg and 932.9 mg and the mean value was 307.10±196.5 mg.

Daily sodium intakes of children with ASD were ranged between 1614.5 mg and 14793 mg and the mean value was 4392.31±1763.5 mg.

Daily calcium intakes of children with ASD were ranged between 235.4 mg and 1827.7 mg and the mean value was 830.52±291.8 mg.

Daily iron intakes of children with ASD were ranged between 5.3 mg and 102 mg and the mean value was 12.73±10.5 mg.

Daily zinc intakes of children with ASD were ranged between 5.5 mg and 17.8 mg and the mean value was 10.82±2.8 mg.

Daily phosphorus intakes of children with ASD were ranged between 576 mg and 2029.4 mg and the mean value was 1221.03±287.5 mg.

Daily iodine intakes of children with ASD were ranged between 45.3 µg and 422.2 µg and the mean value was 163.72±83.0 µg.

Daily folate intakes of children with ASD were ranged between 137 µg and 654.3 µg and the mean value was 289.33±86.8 µg.

Daily vitamin A intakes of children with ASD were ranged between 194.2 µg and 5393 µg and the mean value was 1052.64±737.7 µg.

Daily vitamin B6 intakes of children with ASD were ranged between 0.7 mg and 3 mg and the mean value was 1.51±0.5 mg.

Daily vitamin B12 intakes of children with ASD were ranged between 0 µg and 9.5 µg and the mean value was 3.73±2.3 µg.

Daily vitamin C intakes of children with ASD were ranged between 15.4 mg and 396.2 mg and the mean value was 116.19±74.5 mg.

Daily vitamin D intakes of children with ASD were ranged between 0 µg and 6.1 µg 96.2 mg and the mean value was 1,6±1,3 µg.

Table 3-3. Water consumption of children with ASD

		n	%
How much water does your child drink per day?	**0-250 ml**	1	1,3
	250-500 ml	4	5
	500-750 ml	3	3,8
	750- 1000 ml	5	6,3
	1000-1500 ml	37	46,3
	> 1500 ml	30	37,5

1.3% (n=1) of children drank 0-250 ml of water, 5% (n=4) of children drank 250-500 ml of water, 3.8% (n=3) of children drank 500-750 ml of water, 6.3% (n=5) of children drank 750-1000 ml of water, 46.3% (n=37) of children drank 1000-1500 ml of water and 37.5% (n=30) of children drank more than 1500 ml of water per day.

Table 3-4. Comparison of daily intakes of children with ASD with Dietary Reference Intakes (DRIs): Estimated Average Requirements (EAR)[52]

Nutrients	**Overweight (25)**		**Obese (55)**	
Protein	Above EAR	20	Meets DRI	46
	Below EAR	5	<80% DRI	9
	Range: 63,3 – 280,2 %		Range: 77 – 269,6 %	
Carbohydrate	Above EAR	25	Above EAR	55
	Below EAR	0	Below EAR	0
	Range: 153,9 – 360,6 %		Range: 168,3 – 469,3 %	
Fibre	Above EAR	4	Above EAR	11
	Below EAR	21	Below EAR	44
	Range: 26,1 – 116,6 %		Range: 25,5 – 163,9 %	
Cholesterol	Above EAR	17	Above EAR	43
	Below EAR	8	Below EAR	12

	Range: 29,7 – 466,5 %	Range: 21 – 356 %
Sodium	Above EAR 25 Below EAR 0 >Tol. U. Level 25 Range: 163,4 – 413,1 %	Above EAR 55 Below EAR 0 >Tol. U. Level 53 Range: 107,6 – 986,2 %
Calcium	Above EAR 2 Below EAR 23 >Tol. U. Level 0 Range: 21,4 – 112,2 %	Above EAR 8 Below EAR 47 >Tol. U. Level 0 Range: 30,1 – 166,2 %
Zinc	Above EAR 22 Below EAR 3 >Tol. U. Level 0 Range: 64,7 – 225,7 %	Above EAR 44 Below EAR 11 >Tol. U. Level 0 Range: 72,9 – 254,3 %
Iron	Above EAR 23 Below EAR 2 >Tol. U. Level 0 Range: 94,8 – 239 %	AboveEAR 46 Below EAR 9 >Tol. U. Level 0 Range: 89,8 – 267,8 %
Vitamin A	Above EAR 18 Below EAR 7 >Tol. U. Level 1 Range: 51,8 – 856 %	Above EAR 48 Below EAR 7 >Tol. U. Level 4 Range: 30,8 – 621 %
Vitamin B6	Above EAR 23 Below EAR 2 >Tol. U. Level 0 Range: 63,6 – 263,6 %	Above EAR 50 Below EAR 5 >Tol. U. Level 0 Range: 72,7 – 275 %
Vitamin B12	Above EAR 22 Below EAR 3 >Tol. U. Level 0 Range: 5 – 633,3 %	Above EAR 43 Below EAR 12 >Tol. U. Level 0 Range: 0 – 546,7 %
Vitamin C	Above EAR 22	Above EAR 43

	Below EAR 3	Below EAR 12
	>Tol. U. Level 0	>Tol. U. Level 0
	Range: 56 – 617,2 %	Range: 39,5 – 834,6 %
Vitamin D	Above EAR 0	Above EAR 0
	Below EAR 25	Below EAR 55
	>Tol. U. Level 0	>Tol. U. Level 0
	Range: 2 – 61 %	Range: 0 – 53 %
Total Folic Acid	Above EAR 8	Above EAR 24
	Below EAR 17	Below EAR 31
	>Tol. U. Level 0	>Tol. U. Level 0
	Range: 41,5 – 134,7 %	Range: 43,1 – 198,3 %

As seen in Table 3-4, 20 overweight children and 46 obese children consumed protein excessively as well as all children consumed carbohydrate excessively. Cholesterol levels of 17 overweight and 43 obese children are high. Twenty-two overweight, 44 obese children's zinc intakes and 23 overweight, 46 obese children's iron intakes were excessive. Vitamin A intakes are found excessive in 18 overweight and 48 obese children; 1 of the overweight and 4 of the obese children's vitamin A intakes were above the Tolerable Upper Level (UL). Twenty-three overweight and 50 obese children's vitamin B6 intakes were excessive, and 22 overweight and 43 obese children's both vitamin B12 and vitamin C intakes found excessive. The great excessive intake was seen in sodium intakes. All of the children's (n=80) sodium intakes were excessive, furthermore all overweight children and 53 of the obese children's sodium intakes were above the UL.

Twenty-one overweight and 44 obese children's fibre intakes were insufficient; 23 overweight and 47 obese children's calcium intakes were insufficient; 17 overweight and 31 obese children's folic acid intakes were found insufficient as well. All children had an insufficient daily intake of vitamin D.

Table 3-5. Evaluation of energy, macro and micro nutrient intakes according to percentile classifications

	Overweight	Obese	p*
	Mean±SD (median)	Mean±SD (median)	
Energy (kcal)	2217,0±304,4 (2103,4)	2210,1±365,1 (2132,2)	***0,713***
Protein (g)	76,3±22,0 (74,2)	76,9±20,9 (74,7)	***0,996***
Carbohydrate (g)	262,5±50,1 (275,6)	266,3±57,0 (256,4)	***0,971***
Fat (g)	91,0±24,9 (82,2)	88,4±23,1 (85,2)	***0,967***
Fibre (g)	21,7±9,5 (20,2)	23,2±9,2 (22,2)	***0,324***
Cholesterol (mg)	331,4±243,8 (260,6)	296,1±172,2 (263,7)	***0,905***
Sodium (mg)	4218,7±1099,5 (4045,5)	4471,3±1998,1 (4001,9)	***0,988***
Calcium (mg)	753,8±255,0 (791,3)	865,4±302,8 (832,7)	***0,172***
Iron (mg)	11,9±2,6 (11,7)	13,1±12,6 (11,9)	***0,579***
Zinc (mg)	10,7±2,4 (10,4)	10,9±2,9 (11)	***0,917***
Phosphorus (mg)	1183,0±253,2 (1205,4)	1238,3±302,4 (1230,3)	***0,452***
Iodine (µg)	171,4±87,0 (167,1)	160,2±81,6 (143,2)	***0,579***
Folate (µg)	266,9±72,5 (265,0)	299,6±91,4 (297,4)	***0,148***
Vitamin A (µg)	1108,7±981,4 (930,6)	1027,2±604,9 (840,8)	***0,872***
Vitamin B6 (mg)	1,52±0,4 (1,4)	1,5±0,5 (1,4)	***0,614***
Vitamin B12 (µg)	4,3±2,4 (4,4)	3,5±2,1 (3,1)	***0,182***
Vitamin C (mg)	108,8±67,0 (76,4)	119,6±78,0 (109,5)	***0,593***
Vitamin D (µg)	1,7±1,5 (1,1)	1,6±1,2 (1,4)	***0,950***
Sugar (g)	1,4±4,0 (0)	0,2±1,6 (0)	***0,054***

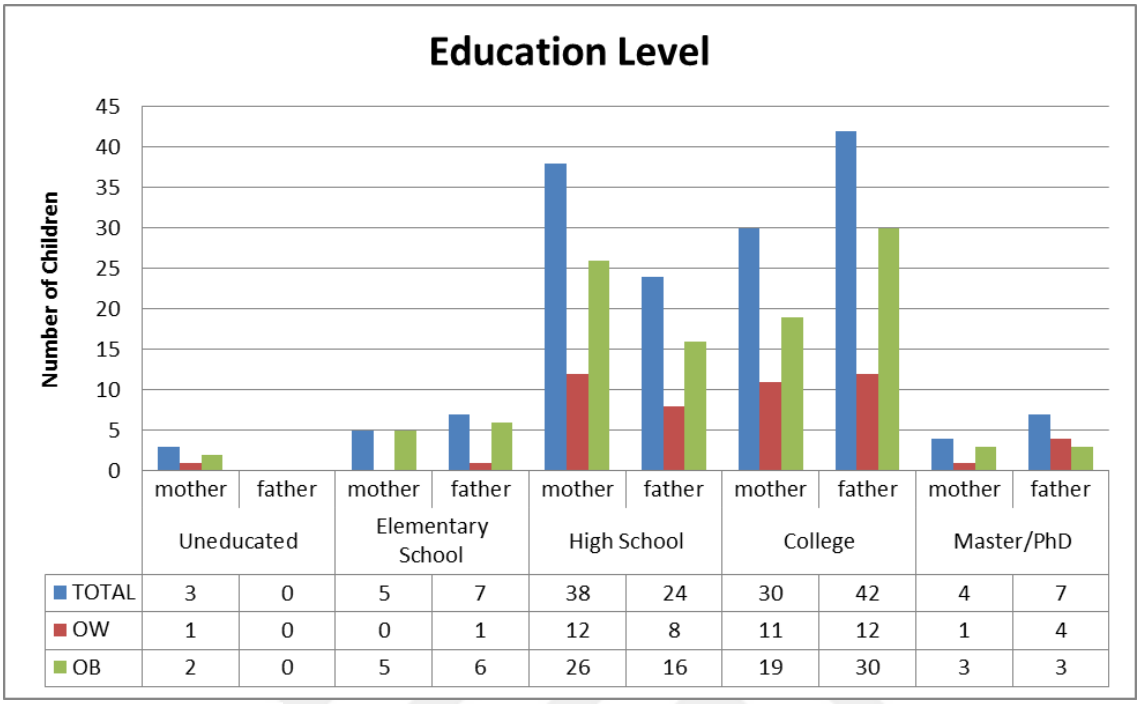
Mann-Whitney U test was used

*p<0.05 is considered significant

According to the percentile classifications, no statistically significant differences were observed among daily energy, protein, carbohydrate, fat, fibre, cholesterol, sodium, calcium, iron, zinc, phosphorus, iodine, folate, vitamin A, vitamin B6, vitamin B12, vitamin C, vitamin D and sugar intakes between overweight and obese children with ASD (p<0.0.5).

3.2. Socioeconomic Status

3.2.1. Education Level of Parents



	mother	father	mother	father	mother	father	mother	father	mother	father
	Uneducated		Elementary School		High School		College		Master/PhD	
TOTAL	3	0	5	7	38	24	30	42	4	7
OW	1	0	0	1	12	8	11	12	1	4
OB	2	0	5	6	26	16	19	30	3	3

OW: Overweight, OB: Obese

Figure 3-1. Education level of the parents of the children with ASD (n=80)

Figure 3-1 shows the education levels of the families of children with ASD. According to the table:

There are 10 uneducated parents; 3 of them are mothers, 7 of them are fathers. The number of uneducated paren3ts is higher for obese children than overweight children.

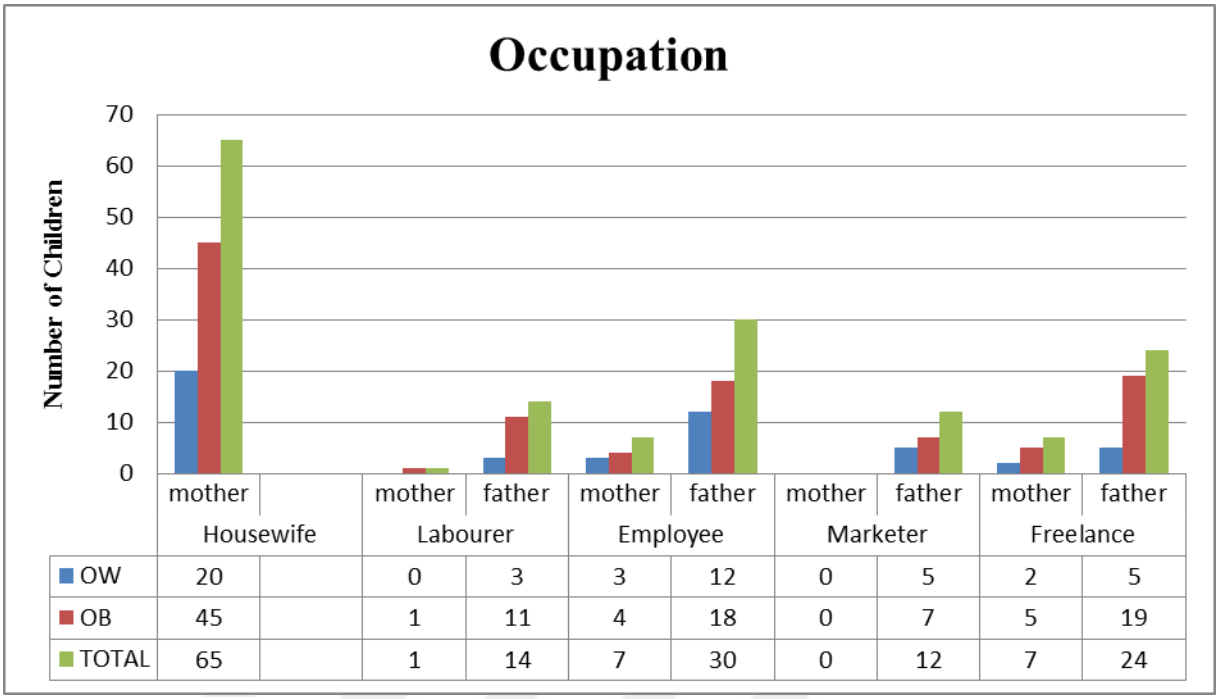
There are 29 elementary-school graduated parents; 5 of them are mothers, 24 of them are fathers. This rate is also higher in obese children's parents.

There are 80 high-school graduated parents; the amount of mothers and fathers are almost the same (38 of them are mothers while 42 of them are fathers). The number of parents is higher in obese children.

There are 37 parents who graduated from college; 30 of them are mothers and 7 of them are fathers. The number of parents who graduated from college is higher in obese children.

There are 4 parents with masters / PhD degree and all of them are mothers. The number is higher in obese children.

3.2.2. Occupation of Parents



	Housewife		Labourer		Employee		Marketer		Freelance	
	mother		mother	father	mother	father	mother	father	mother	father
OW	20		0	3	3	12	0	5	2	5
OB	45		1	11	4	18	0	7	5	19
TOTAL	65		1	14	7	30	0	12	7	24

OW: Overweight, OB: Obese

Figure 3-2. Occupations of the parents of the children with ASD (n=80)

Figure 3-2 shows the occupations of the families of children with ASD. According to the table:

A great portion of mothers are housewives (65 out of 80).

Only one mother is labourer who is an obese child's mother; 14 fathers are labourers (11 of them are obese children's fathers).

37 parents are employees (7 of them are mothers, 30 of them are fathers) – 22 of these are obese children's parents whereas 15 of them are overweight children's parents.

12 fathers are marketer (7 of them are obese children's fathers, 5 of them are overweight children's fathers), however there is no marketer mother.

31 parents work in a freelance job; 7 of them are obese children's parents and 24 of them are overweight children's parents.

3.2.3. Number of Individuals in the Family

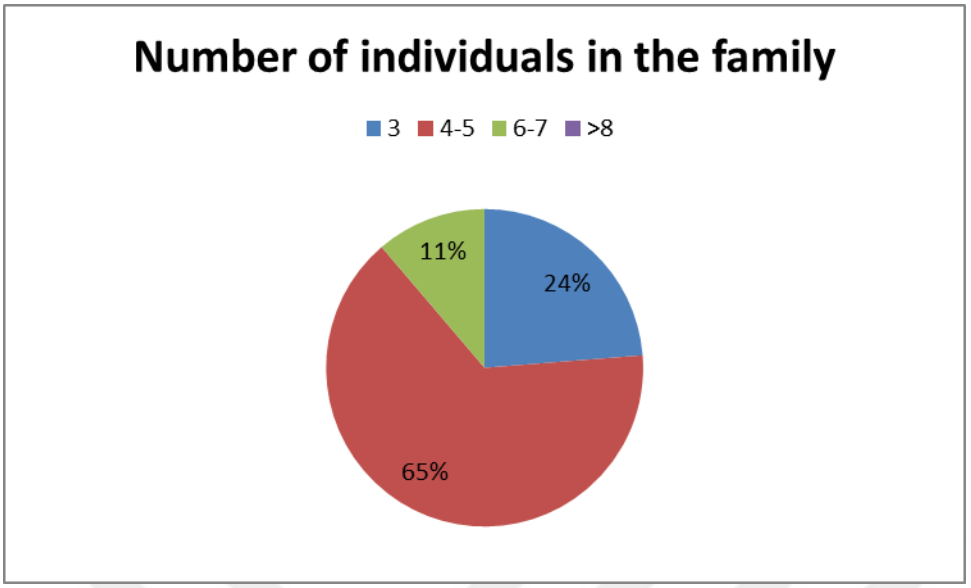


Figure 3-3. Number of individuals in the family

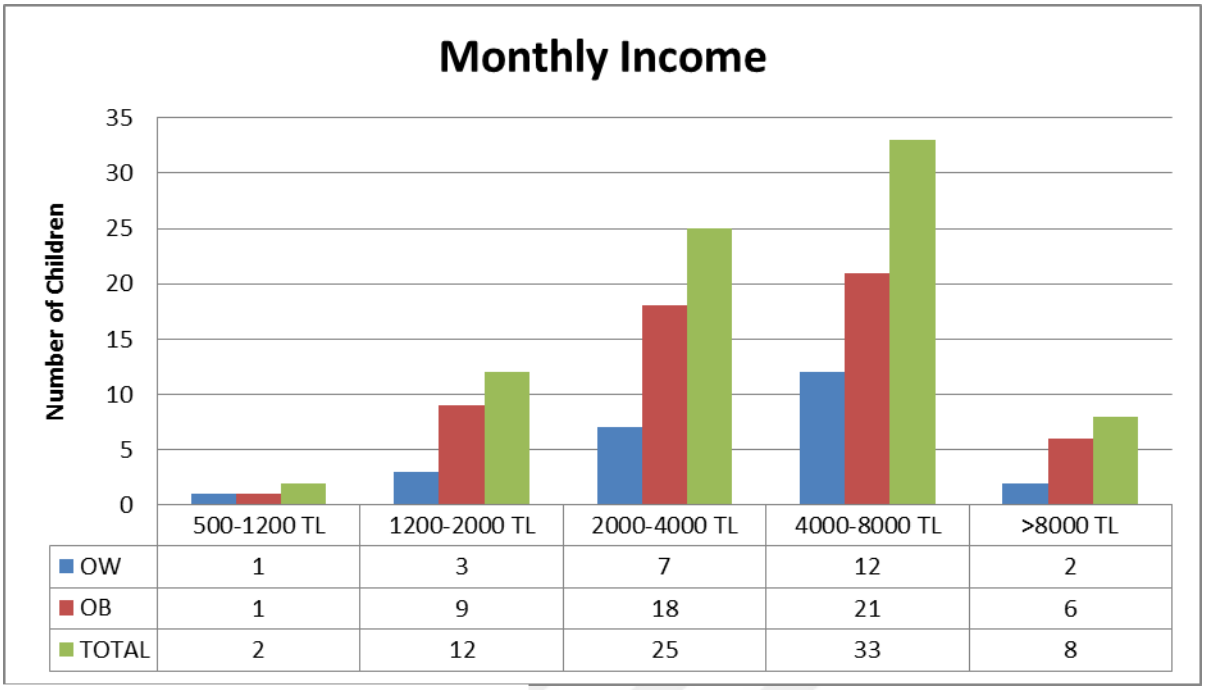
According to the Figure 3-3:

11% (9 children) live in a family that consists of 6-7 individuals.

24% (19 children) live in a family that consists of 4-5 individuals.

The majority of children – 65% (52 children) did not have any brothers or sisters.

3.2.4. Monthly Income Level



OW: Overweight, OB: Obese

Figure 3-4. Monthly income level of the families (n=80)

According to the Figure 3-4:

2 families (2,5 %) have a monthly income between 500 – 1200 TL

12 families (15 %) have a monthly income between 1200 – 2000 TL

25 families (31,25 %) have a monthly income between 2000 – 4000 TL

33 families (41,25 %) have a monthly income between 4000 – 8000 TL

8 families (10 %) have a monthly income above 8000 TL

When parents were asked whether market prices affect families' food choices, 100% (n=80) of them responded as "yes".

Table 3-6. Evaluation of family statuses according to the percentile classification

		Percentile Classification		
		Overweight	**Obese**	***p****
		n (%)	**n (%)**	
Mother's Education	**Low education**	1 (%4)	7 (%12,7)	***0,456***
	High-school	12 (%48)	26 (%47,3)	
	Higher education	12 (%48)	22 (%40)	
Father's Education	**Low education**	1 (%4)	6 (%10,9)	***0,597***
	High-school	8 (%32)	16 (%29,1)	
	Higher education	16 (%64)	33 (%60)	
Father's Job	**Worker**	3 (%12)	11 (%20)	***0,319***
	Employee	12 (%48)	18 (%32,7)	
	Marketer	5 (%20)	7 (%12,7)	
	Freelance	5 (%20)	19 (%34,5)	
Mother's Job	**Housewife**	20 (%80)	45 (%81,8)	***[+]1,000 f***
	Employee	5 (%20)	10 (%18,2)	
Number of individuals in the family	**3**	8 (%32)	11 (%20)	***0,469***
	4-5	14 (%56)	38 (%69,1)	
	6-7	3 (%12)	6 (%10,9)	

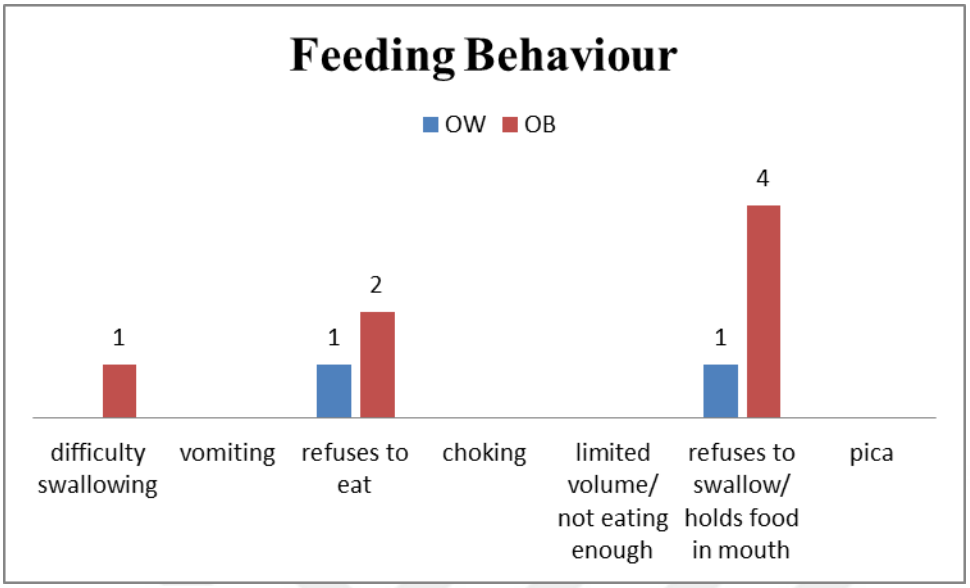
Chi-Square test *[+]Fisher's Exact test*

*p<0.05 is considered significant

According to the percentile classifications, there were no statistically significant differences observed among mothers' and fathers' education levels, mothers' and fathers' jobs and number of individuals in the family between overweight and obese children with ASD (p<0.05).

3.3. Feeding Assessment

3.3.1. Feeding Behaviour



OW: Overweight, OB: Obese

Figure 3-5. Feeding behaviours of the children with ASD during the meal-time (n=9)

According to the Figure 3-5:

Most of the feeding behaviours during the meal time are shown by obese children (total 9 children: 7 obese and 2 overweight). These feeding behaviours are; difficulty swallowing – by 1 child (obese), refuses to eat – by 3 children (2 obese and 1 overweight) and refuses to swallow/holds food in mouth – by 5 children (4 obese and 1 overweight).

Table 3-7. Feeding behaviours of the children with ASD

		n	%
Does your child show any of the following behaviours during the meal time?	**Difficulty swallowing**	1	11,1
	Refuses to eat	3	33,3
	Holds food in mouth	5	55,6

11.1% (n=1) of the children had difficulty in swallowing, 33.3% (n=3) of the children had food refusal and 55.6% (n=5) of the children held food in mouth.

Table 3-8. Feeding behaviour of the children with ASD during the time with family

		n	%
Where does your child usually sit during mealtimes?	**At the table**	75	93,8
	On the couch	3	3,8
	In front of TV	2	2,5
Where in the house is your child fed?	**Kitchen**	62	77,5
	Living room	8	10
	Sitting room	10	12,5
With whom does your child usually eat/drink?	**Alone**	8	10
	With parents	66	82,5
	With siblings	4	5
	With caretaker	2	2,5
Who feeds your child?	**Mother**	18	22,5
	Siblings	2	2,5
	Caretaker	3	3,8
	Himself	57	71,3
Who cooks in the house?	**Mother**	73	91,3
	Father	1	1,3
	Caretaker	6	7,5

When parents / caretakers were asked where the child sits during the meal time, the answers were: 93.8% (n=75) on the table, 3.8% (n=3) on the couch and 2.5% (n=2) in front of TV.

When parents / caretakers were asked where in the house the child is fed, the answers were: 77.5% (n=62) in the kitchen, 10% (n=8) in the living room and 12.5% (n=10) in the dining room.

When parents / caretakers were asked with whom does the child eat/drink, the answers were: 10% (n=8) alone, 85.5% (n=66) with parents, 5% (n=4) with siblings, 2.5% (n=2) with caretaker.

When parents / caretakers were asked who feeds the child, the answers were: 22.5% (n=18) mother, 2.5% (n=2) siblings, 3.8% (n=3) caretaker and 71.3% (n=57) by himself.

The answers for who cooks in the house were: 91.3% (n=73) mother, 1.3% (n=1) father and 7.5% (n=6) caretaker cooks.

3.3.2. Food Selectivity

Table 3-9. Distribution of the selectivities among overweight and obese children (n=29)

Selectivities	TOTAL	OW	OB
Not consuming bread	3		3
French fries	1		1
Fruit	3	1	2
Not consuming meat	2	1	1
Soup	2		2
Tea	1		1
Dairy products	5	1	4
Coke	2		2
Fruit juice	1		1
Pasta	2	1	1
Salami	1		1
Bakery	1		1

Olive	1		1
Mashed food	1	1	
Egg	1	1	
Cookie/wafer	2		2
TOTAL	**29**	**6**	**23**

OW: Overweight, OB: Obese

According to the Table 3-9:

Obese children have more selective behaviours than overweight children. There are 29 selective behaviours; 23 of them belong to obese children and 6 of them belong to overweight children.

Mostly seen selectivity is about dairy products (this selectivity is two-sided: Some children want to consume dairy products and some children refuse to consume dairy products). One cause of this behaviour can be the casein-free diet and the other cause can be lactose intolerance.

Similarly one of the causes of not consuming bread can be gluten-free diet.

Other commonly seen selectivities were based on sugary foods and beverages like cookie, wafer, tea with sugar and coke.

11.5% (n=3) of the children refuse to consume bread, 7.7% (n=2) of the children refuse to consume meat and some subjects showed preference/selectivity toward specific food. These are: 3.8% (n=1) french fries, 11.5% (n=3) fruit, 7.7% (n=2) soup, 3.8% (n=1) tea, 19.2% (n=5) dairy, 7.7% (n=2) coke, 3.8% (n=1) fruit juice, 7.7% (n=2) pasta, 3.8% (n=1) salami 3.8% (n=1) bakery, 3.8% (n=1) mashed foods, 3.8% (n=1) olive, 3.8% (n=1) egg and 7.7% (n=2) cake / cookie.

Table 3-10. Specific diets of children with ASD

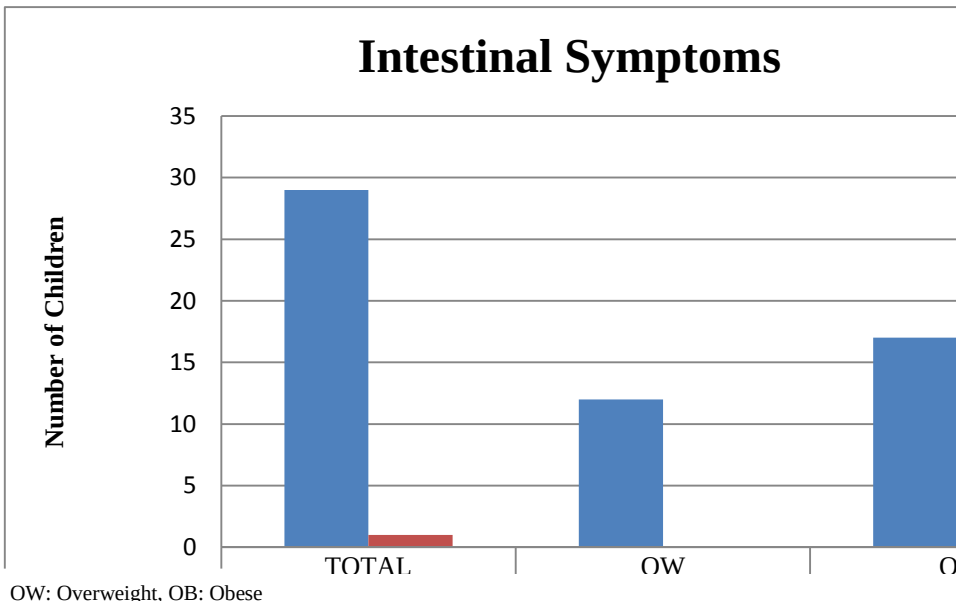
		n	%
Does your child have a specific diet?	**Yes**	5	6,3
	No	75	97,3
What is the reason of this specific diet?	**Autism therapy**	2	40
	Weight loss	2	40
	Other health problems	1	20
Why is your child applying this diet?	**Doctor said so**	2	40
	Our family preference	1	20
	Dietitian said so	2	40

6.3% (n=5) of the children had a specific diet and 97.3% (n=75) of the children had no specific diet.

The reasons of those specific diets were: 40% (n=2) autism therapy (gluten-free and casein-free diet), 40% (n=2) weight loss and 20% (n=1) had another reason.

40% (n=2) of the parents / caretaker had been suggested the specific diet by doctor, 40% (n=2) by dietitian and 20% (n=1) was family's own decision.

3.3.3. Intestinal Symptoms



OW: Overweight, OB: Obese

Figure 3-6. Intestinal symptoms of the children (n=30)

According to the Figure 3-6:

Thirty (37.5%) children have abnormal bowel movements. Twenty-nine of them had long-term constipation and one of them had long-term diarrhea.

Seventeen children who have long-term constipation issue are obese; twelve of them are overweight children.

The only child that has diarrhea is obese.

Table 3-11. Bowel movements of children with ASD

		n	%
How often does your child have a bowel movement?	**Daily**	50	62,5
	Every Other Day	30	37,5
Which issue does he have?	**Constipation (hard stools)**	29	93,5
	Diarrhea (loose stools)	1	3,2
	Constipation & Diarrhea	1	3,2

62.5% (n=50) of children had a daily bowel movement and 37.5% (n=30) of children had a bowel movement every other day.

93.5% (n=29) of the children had constipation, 3.2% (n=1) of the children had diarrhea and 3.2% (n=1) of the children had both constipation and diarrhea.

Table 3-12. Evaluation of daily fibre consumption according to bowel movements

How often does your child have a bowel movement?	**Fibre intake**
	Mean±SD (median)
Daily	21,20±6,83 (21,2)
Every Other Day	25,31±11,94 (22,4)
p*	**0,247**

Mann-Whitney U test was used

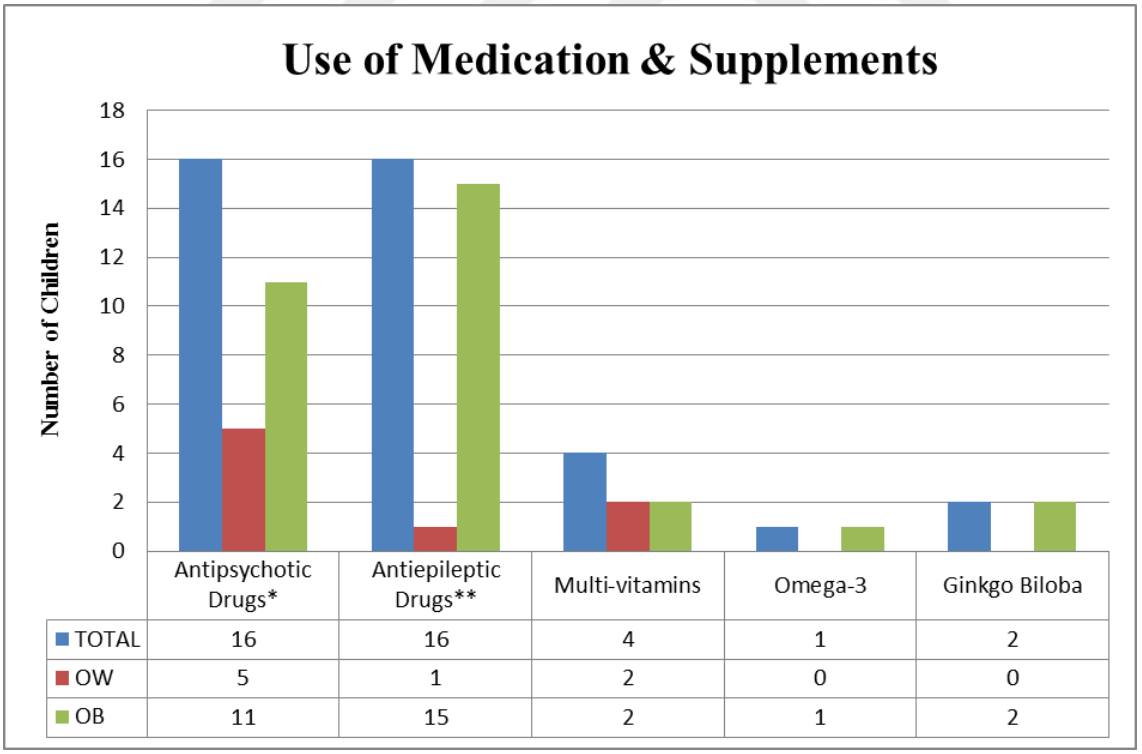
*p<0.05 is considered significant

According to the bowel movements, no statistically significant differences were observed among daily fibre consumption between overweight and obese children with ASD ($p<0.05$).

3.3.4. Use of Medication and Supplements

Table 3-13. Drug / supplement usage among the children with ASD

		n	%
Use of medication	**Yes**	29	36,3
	No	51	63,8
Type of medication/supplement	**Antipsychotic***	16	57,1
	Antiepileptic**	16	57,1
	Multivitamin	4	14,3
	Omega - 3	1	3,6
	Ginkgo Biloba	2	7,1



OW: Overweight, OB: Obese

Figure 3-7. Medication and supplement usage of children with ASD (n=37)

*****Antipsychotic drugs include risperidone, naltrexone HCl and olanzapine as active substances. Antipsychotics are a class of psychiatric medication primarily used to manage psychosis (including delusions, hallucinations, or disordered thought), in particular in schizophrenia and bipolar disorder, and are increasingly being used in the management of non-psychotic disorders [53].

**Antiepileptic drugs (AED) include sodium valproate as active substance. AEDs are primarily used for seizure treatment.

According to the Figure 3-7 and Table 3-13:

Thirty of the children use antipsychotic and antiepileptic drugs which cause weight-gain. Twenty-two of them are obese children whereas only eight of them are overweight children.

36.3% (n=29) of the children were using drugs / supplements and 63.8% (n=51)

When the parents / caretakers were asked which drugs / supplements, the answers were: 57.1% (n=16) antipsychotic, 57.1% (n=16) antiepileptic, 14.3% (n=4) multivitamin, 3.6% (n=1) omega-3 and 7.1% (n=2) ginkgo biloba.

Table 3-14. Evaluation of usage of drugs and supplements according to the percentile classifications

		Percentile Classification		
		Overweight	**Obese**	***p****
		n (%)	**n (%)**	
Medicine	**Yes**	7 (%28)	21 (%38,2)	***0,527***
	No	18 (%72)	34 (%61,8)	

Continuity Correction Yates test was used

*p<0.05 is considered significant

According to the percentile classifications, no statistically significant differences were observed among usage of drugs and supplements between overweight and obese children with ASD (p<0.0.5).

3.4. Physical Activity

Table 3-15. Physical activity levels of overweight and obese children (n=80)

Physical Activity	**TOTAL**	**OW**	**OB**
High (>3000 MET)	0	0	0
Moderate (600 – 2999 MET)	9	5	4
Low (<600 MET)	71	20	51

According to the Table 3-15:

There are no children with high level of physical activity.

There are 9 (11%) children whose physical activity is moderate, 5 of them are overweight and 4 of them are obese.

There are 71 (89%) children whose physical activity is low, 20 of them are overweight and 51 of them are obese.

Table 3-16. Physical activity levels in 100th scales

Total METs Scores		**Range**	**Mean±SD**
		0-2946	291,1±416,6
Category	**Low**	71	88,8
	Moderate	9	11,3
Scores	**0-100**	24	30
	101-200	22	27,5
	201-300	10	12,5
	301-400	13	16,3
	401-500	2	2,5
	601-700	2	2,5
	701-800	1	1,3
	801-900	1	1,3
	901-1000	1	1,3
	1001-2000	3	3,8
	2001-3000	1	1,3

Total METs scores were ranged between 0 and 2946 points and the mean value was 291.1±416.6 points.

There were 71 (88.8%) children who have low METs score and 9 (11.3%) children who have moderate METs score. There were no children who have high METS score.

Table 3-17. Evaluation of total METs scores according to the percentile classifications

	Percentile Classification		***p****
	Overweight	**Obese**	
	Mean±SD (median)	**Mean±SD (median)**	
Total METs Scores	416,16±620,39 (198)	234,3±268,95 (165)	[1]***0,251***
	n (%)	**n (%)**	
0-100	4 (%16)	20 (%36,4)	[2]**0,194**
101-200	10 (%40)	12 (%21,8)	
201-300	2 (%8)	8 (%14,5)	
301-400	4 (%16)	9 (%16,4)	
≥ 400	5 (%20)	6 (%10,9)	

[1]*Mann-Whitney U test* [2]*Chi-Square test*

*p<0.05 is considered significant

Total METs scores of overweight children were higher than obese children, however according to the percentile classifications, no statistically significant differences were observed among total METs scores between overweight and obese children with ASD (p<0.05).

When the METs scores were grouped into 100 scales, there were no statistically significant differences among total METs scores between overweight and obese children with ASD (p<0.05).

Table 3-18. Evaluation of daily vitamin D intake according to total METs scores

METs Scores	Vit. D
	Mean±SD (median)
0-100	1,52±1,43 (1,45)
101-200	1,68±1,35 (1,35)
201-300	1,56±1,43 (1,05)
301-400	1,95±1,03 (1,9)
≥ 400	1,26±0,96 (1,1)
p*	**0,577**

Kruskal Wallis test was used

*p<0.05 is considered significant

According to the METs scores, there were no significant differences among daily vitamin D intake of overweight and obese children with ASD.

4. DISCUSSION

This study has shown that number of obese children with ASD are more than the number of overweight children with ASD.

Evaluation of energy, macro and micro nutrient intakes would be easier when it is divided into four categories: adequate intake (approximately and exactly 100% of DRI values) [54], inadequate intakes (below 80% of DRI values) [54, 55], intakes in the border line (between 80% - 85% of DRI values) and very high intakes (above 200% of DRI values).

Protein and carbohydrate intakes of both overweight and obese children with ASD are excessive. The main reasons for excessive carbohydrate intake could be the low socio-economic status and the low monthly incomes. Families find it easier to cook high carbohydrate containing foods such as pasta, rice, pastry etc. The families who could not afford to buy meat and fish 2 – 3 times a week, prepare meals based on carbohydrate. A great proportion (97,5 %) of the children have sodium intake levels higher than the UL value. Similarly, Bicer and Alsaffar (2013) and Hyman et al. (2012) reported elevated intake of sodium in all age groups of children with ASD [28, 56]. When the 3-day food records were examined, it is is seen that most salt in these children's diets comes from fastfoods and processed foods (i.e. snacks). Families find it easier and time-saving to feed their children with fast-food and reward their children by giving snacks

80% of obese children with ASD and 84% of overweight children with ASD's fibre intakes were found inadequate. Consuming less vegetable meals and salads could be the most distinct reason as observed by the 3-day food records in the study.

The number of children with ASD who have higher cholesterol intakes (68% of overweight children with ASD and 78% of obese children with ASD) was more than the others. These children need a diet modification based on less diet cholesterol, because diet cholesterol lightly affects the blood cholesterol but still it is important for the children's health, especially in the long term.

Vitamin D intakes of all children with ASD are inadequate. In support of the current findings, in a pilot study a quantitative 'Food Frequency Questionnaire' (FFQ) was used

to prospectively study the nutritional intake of 20 children (5–13 years old) with autism. The results of this questionnaire study suggested that 50% of these children with autism were likely to have inadequate vitamin D intake [57]. This could be a result of these children's selectivities, especially not consuming dairy products. Several observational and clinical studies reported vitamin D deficiency in children with autism as a consequence of the highly selective eating behaviour that is typical for this group [26, 58-61]. Besides, lack of physical activity and not going out could be a stronger reason for this inadequate intake, because ninety percent of human vitamin D stores come from skin production, not oral intake [62, 63].

There were no differences found between overweight and obese children with ASD's families' education levels and occupations. Further discussion was not possible.

Most of the families (66 families out of 80) have a monthly income higher than 2.000 TL. Families' socio-economic statuses are important for both family and the children with ASD because clearly children with ASD require more educational and behavioral services than most children [64, 65]. They spent more time during physician visits than other children. Liptak et al. found that annual expenses for children with ASD ($6,132 which makes 12,264 TL) were more than for other children ($860 which makes 1,720 TL) [66]. Children with ASD have a lot more medical illnesses that typical children. In a study, it is estimated the lifetime cost for a person with autism exceeded £l2,400,000 which makes 43,400,000 TL. The main costs in their analyses were for living support and day activities [67]. In another study it is estimated that the ‘‘total lifetime costs per case’’ of autism to be $1,680,000 which makes 3,360,000 TL [68]. In Turkey, hunger level for a familiy with four members was set as 1,174,65 TL and the poverty level for a family with four members was set as 3,826,24 TL in August 2014. Two families in this study are below the hunger level and a total number of 39 families (approxiametly half of the families in the study) are below the level of poverty. These statistics are for the families with healthy members. So an individual with ASD needs a special education and treatment which makes the family's expenses a lot higher. The outcome could be; a family with an autistic individual can save their money for their special needed child's treatment, education and medications rather than food. This can be one of the strongest reasons why the child whose family's monthly income is low becomes overweight or obese and have some severe deficiencies of vitamins and minerals

Only 9 children with ASD show unusual feeding behaviour or feeding problems and a great portion of these children (7 children out of 9) are obese. The feeding problems are difficulty swallowing, refusing to eat and refusing to swallow / holding food in mouth. Similar feeding problems have been reported by others as well [26, 27, 69-73]. In a systematic review which was composed of seven descriptive studies with a total of 381 children with ASD, meal-time challenges like limited food repertoire often to the point of nutritional compromise; food refusal; food jags; inflexibility related to food presentation, utensils, dishes, brands and packaging; sensory issues (taste, texture, and smell sensitivities); mealtime behavior issues; difficulty accepting new foods; and nutritional issues were reported [74]. These problems were not transient, requiring long-term follow-up and support for parents in dealing with significant mealtime challenges [75].

Most of the children (75 out of 80) sit at the table during meal time, 62 children are fed in the kitchen, 66 children have their meal with their parents, 57 children feeds by himself and others by mother, caretaker and siblings, 73 children's mothers cook in the house. In opposition to some studies there were no sign of hyperactivty like wandering around or standing during meal times [76, 77] and most of the children's will was having their meal with family rather than alone [78].

Food selectivity could be expected to limit the energy intake and result in losing weight or to expand the energy intake and result in gaining weight. As expected, higher intake levels of energy dense foods (fries, juices, coke and snacks) and lower intake of fruits and vegetables in children with ASD could make some differences between BMI and percentile values. This hypothesis is consistent with the results that children with ASD prefer energy-dense foods [70, 72].

Five children with ASD out of 80 children have a specific diet (2 gluten-free, casein-free diet GFCF, 2 for losing weight and 1 for another reason). According to a continuous etiological theory, one of the reasons of autism might be because of insufficient enzymatic activity, the increase in gastrointestinal permeability in gut and the absorption of toxic materials of incomplete digestion of proteins from gluten (cereals) and casein (dairy) [79-85]. Inadequately metabolised proteins are purported to breakdown into peptides that are absorbed across the dietary membranes into the body's systems. It is

suggested that these peptides may become biologically active through binding with opioid receptors. The resulting excess of opioids is thought to lead to the behaviours noted in autistic spectrum disorders [86]. Dietary intervention involving the elimination of foods that contain gluten and/or casein has been found to be effective in a meliorating some of the unusual behaviours and symptoms of autism. This is why some children with ASD follow GFCF diet intentionally or unintentionally.

Associated with the gastrointestinal dysfunctions that were mentioned above; 30 children out of 80 have abnormal bowel movements (29 constipation and 1 diarrhea). When this situation was evaluated with fibre consumption, no significant relationship was found, however one of the major reasons of constipation is known as lack of fibre consumption. Many studies revealed that the fact that constipation is uncommon in societies in which the dietary fiber content is high has been used as a justification to consider low-fiber diets as a predisposing factor, children with chronic constipation ingested less fiber than those who do not have any constipation issue, therefore a high-fiber diet as an important measure for the treatment of constipation [87-89].

Twenty per cent of the children with ASD use antipsychotic drugs, 20% of the children with ASD use antiepileptic drugs and 9% of the children with ASD use supplements (vitamins and minerals) and a great portion of (72%) children with ASD that use drugs and/or supplements are obese children. However no statistically significant differences were found between drug usage and obesity in children with ASD.

One untoward side effect of many antipsychotic drugs is often-substantial weight gain [90-94]. A recent meta-analysis of over 80 studies on weight change during antipsychotic treatment showed a mean weight gain after 10 weeks of treatment of 4.45 kg with clozapine, 4.15 kg with olanzapine, and 2.10 kg with risperidone [95].

One of the drugs most clearly associated with weight changes is valproate (active substance of most of the antiepileptic drugs) [45]. In many studies it is seen that weight loss and a significant decrease in BMI occurred when patients treated with valproate or some other active substance containing antiepileptic drugs [46, 96, 97].

Furthermore, sodium valproate is one of the few drugs that lower vitamin D levels [98] and one of the few gestational drugs that lead to autism spectrum disorder [99]. Epileptic

seizures are common in ASD and besides antiepileptic drugs, it is found that vitamin D reduces the incidence of seizures [100].

According to the physical activity levels of overweight and obese children with ASD, there is no child whose physical activity level is high. Eleven per cent of the children have moderate and 89% of the children have low physical activity level. Majority of the children who have low physical activity level are obese (n=51). The results did not change when the categories (low, medium, high) were divided into 100^{th} scale scores. As proposed by several studies low level of physical activity can be associated with hypotonia (decreased muscle tone and strength) which is common in children with autism [101]. Furthermore, a study of Trost et al. claims that adolescents with ASD are less active than previous reports on peers without disabilities [102].

Half of the children with ASD's daily energy intakes are sufficient and half of them are insufficient (25 overweight – 13 meet DRI, 12 below DRI and 55 obese – 26 meet DRI, 29 below DRI). The high values are 113,8% of DRI for overweight and 137,2% of DRI for obese children with ASD. Eventhough half of the children's energy intakes were insufficient, these children are overweight and obese. According to the physical activity levels of children with ASD in current study, one of the reasons for these children to be overweight and obese could be lack of physical activity.

Personal communications with parents / caregivers and observations of children with ASD in the study revealed that children have difficulty feeling satisfied with their meals; i.e. even if they are supposed to be full, they do not stop eating until they see the cooking pan / meal box / snack bag totally empty. In order to overcome this issue, there is one important thing that parents should do: portioning. The child should not be allowed to eat from a pan or a big sized serving dish. Parent / caretaker should put the sufficient amount of food onto child's own dish.

The same procedure should apply for snack foods as well. If a child wants some cookie / biscuits etc., giving him some and putting the bag away would be the best solution for these kinds of situations.

It is important to mention that the statistically non-significant findings may be the effect of small sample size, and/or large within-group variance. Clearly, this indicates the need to replicate the study with larger and less heterogenous samples.

Other limitations of this study include short intervention period and the accuracy of family reports.

REFERENCES

1. American Psychiatric Association A, Association AP: **Diagnostic and statistical manual of mental disorders.** 1994.
2. Gillberg C: **The ESSENCE in child psychiatry: early symptomatic syndromes eliciting neurodevelopmental clinical examinations.** *Research in developmental disabilities* 2010, **31:**1543-1551.
3. Matson JL, Mahan S, Hess JA, Fodstad JC: **Effect of developmental quotient on symptoms of inattention and impulsivity among toddlers with autism spectrum disorders.** *Research in Developmental Disabilities* 2010, **31:**464-469.
4. Matson JL, Mahan S, Hess JA, Fodstad JC, Neal D: **Progression of challenging behaviors in children and adolescents with autism spectrum disorders as measured by the Autism Spectrum Disorders-Problem Behaviors for Children (ASD-PBC).** *Research in Autism Spectrum Disorders* 2010, **4:**400-404.
5. Williams KE, Field DG, Seiverling L: **Food refusal in children: A review of the literature.** *Research in developmental disabilities* 2010, **31:**625-633.
6. Gillberg C, Steffenburg S, Schaumann H: **Is autism more common now than ten years ago?** *The British Journal of Psychiatry* 1991, **158:**403-409.
7. Wignyosumarto S, Mukhlas M, Shirataki S: **Epidemiological and clinical study of autistic children in Yogyakarta, Indonesia.** *The Kobe journal of medical sciences* 1992, **38:**1-19.
8. Deb S, Prasad K: **The prevalence of autistic disorder among children with a learning disability.** *The British journal of psychiatry* 1994, **165:**395-399.
9. Baron-Cohen S, Cox A, Baird G, Swettenham J, Nightingale N, Morgan K, Drew A, Charman T: **Psychological markers in the detection of autism in infancy in a large population.** *The British Journal of Psychiatry* 1996, **168:**158-163.
10. Honda H, Shimizu Y, Misumi K, Niimi M, Ohashi Y: **Cumulative incidence and prevalence of childhood autism in children in Japan.** *The British Journal of Psychiatry* 1996, **169:**228-235.
11. Nordin V, Gillberg C: **Autism spectrum disorders in children with physical or mental disability or both. I: Clinical and epidemiological aspects.** *Developmental Medicine & Child Neurology* 1996, **38:**297-313.
12. Arvidsson T, Danielsson B, Forsberg P, Gillberg C, Johansson M, Kjellgren G: **Autism in 3-6-year-old children in a suburb of Goteborg, Sweden.** *Autism* 1997, **1:**163-173.
13. Webb E, Lobo S, Hercas A, Scourfield J, Fraser W: **The changing prevalence of autistic disorder in a Welsh health district.** *Developmental Medicine & Child Neurology* 1997, **39:**150-152.
14. Sponheim E, Skjeldal O: **Autism and related disorders: epidemiological findings in a Norwegian study using ICD-10 diagnostic criteria.** *Journal of Autism and Developmental Disorders* 1998, **28:**217-227.
15. Magnusson P, Saemundsen E: **Prevalence of autism in Iceland.** *Journal of autism and developmental disorders* 2001, **31:**153-163.
16. Fombonne E: **Epidemiological surveys of autism and other pervasive developmental disorders: an update.** *Journal of autism and developmental disorders* 2003, **33:**365-382.

17. Strock M: **Autism Spectrum Disorders (Pervasive Developmental Disorders).** *National Institute of Mental Health (NIMH)* 2007.
18. Kurumu Tİ: **TUIK.** 2012.
19. **Otizm** [http://www.otizmplatformu.org/index.php/otizm/]
20. Bernardini S, Porayska-Pomsta K, Smith TJ: **ECHOES: An intelligent serious game for fostering social communication in children with autism.** *Information Sciences* 2013.
21. Xiong N, Ji C, Li Y, He Z, Bo H, Zhao Y: **The physical status of children with autism in China.** *Research in developmental disabilities* 2009, **30:**70-76.
22. Curtin C, Bandini LG, Perrin EC, Tybor DJ, Must A: **Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review.** *BMC pediatrics* 2005, **5:**48.
23. Egan AM, Dreyer ML, Odar CC, Beckwith M, Garrison CB: **Obesity in young children with autism spectrum disorders: Prevalence and associated factors.** *Childhood Obesity* 2013, **9:**125-131.
24. Bandini LG, Anderson SE, Curtin C, Cermak S, Evans EW, Scampini R, Maslin M, Must A: **Food selectivity in children with autism spectrum disorders and typically developing children.** *The Journal of pediatrics* 2010, **157:**259-264.
25. Matson JL, Fodstad JC, Dempsey T: **The relationship of children's feeding problems to core symptoms of autism and PDD-NOS.** *Research in Autism Spectrum Disorders* 2009, **3:**759-766.
26. Schreck KA, Williams K, Smith AF: **A comparison of eating behaviors between children with and without autism.** *Journal of autism and developmental disorders* 2004, **34:**433-438.
27. Martins Y, Young RL, Robson DC: **Feeding and eating behaviors in children with autism and typically developing children.** *Journal of autism and developmental disorders* 2008, **38:**1878-1887.
28. Bicer AH, Alsaffar AA: **Body mass index, dietary intake and feeding problems of Turkish children with autism spectrum disorder (ASD).** *Research in developmental disabilities* 2013, **34:**3978-3987.
29. Alison M. Kozlowski JLM, Brian Belva, Robert Rieske: **Feeding and sleep difficulties in toddlers with autism spectrum disorders.** *Research in Autism Spectrum Disorders* 2011, **6:**385-390.
30. Must A, Barish E, Bandini L: **Modifiable risk factors in relation to changes in BMI and fatness: what have we learned from prospective studies of school-aged children&quest.** *International Journal of Obesity* 2009, **33:**705-715.
31. Sherry B: **Food behaviors and other strategies to prevent and treat pediatric overweight.** *International Journal of Obesity* 2005, **29:**S116-S126.
32. Ebbeling CB, Feldman HA, Osganian SK, Chomitz VR, Ellenbogen SJ, Ludwig DS: **Effects of decreasing sugar-sweetened beverage consumption on body weight in adolescents: a randomized, controlled pilot study.** *Pediatrics* 2006, **117:**673-680.
33. Dubois L, Farmer A, Girard M, Peterson K: **Regular sugar-sweetened beverage consumption between meals increases risk of overweight among preschool-aged children.** *Journal of the American Dietetic Association* 2007, **107:**924-934.
34. Ludwig DS, Peterson KE, Gortmaker SL: **Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis.** *The Lancet* 2001, **357:**505-508.

35. Wang YC, Bleich SN, Gortmaker SL: **Increasing caloric contribution from sugar-sweetened beverages and 100% fruit juices among US children and adolescents, 1988–2004.** *Pediatrics* 2008, **121:**e1604-e1614.
36. Lin B-H, Morrison RM: **Higher fruit consumption linked with lower body mass index.** *Food review* 2002, **25:**28-32.
37. Piernas C, Popkin BM: **Trends in snacking among US children.** *Health Affairs* 2010, **29:**398-404.
38. Evans EW, Must A, Anderson SE, Curtin C, Scampini R, Maslin M, Bandini L: **Dietary patterns and body mass index in children with autism and typically developing children.** *Research in autism spectrum disorders* 2012, **6:**399-405.
39. Ho HH, Eaves LC, Peabody D: **Nutrient intake and obesity in children with autism.** *Focus on Autism and Other Developmental Disabilities* 1997, **12:**187-192.
40. Keeton VF, Kennedy C: **Update on physical activity including special needs populations.** *Curr Opin Pediatr* 2009, **21:**262-268.
41. Lang R, Koegel LK, Ashbaugh K, Regester A, Ence W, Smith W: **Physical exercise and individuals with autism spectrum disorders: A systematic review.** *Research in Autism Spectrum Disorders* 2010, **4:**565-576.
42. Pan C-Y: **Objectively measured physical activity between children with autism spectrum disorders and children without disabilities during inclusive recess settings in Taiwan.** *Journal of autism and developmental disorders* 2008, **38:**1292-1301.
43. Draheim CC, Williams DP, McCubbin JA: **Prevalence of physical inactivity and recommended physical activity in community-based adults with mental retardation.** *Journal Information* 2002, **40**.
44. Sajid A, Diaz DR, Poor MC: **Adverse effects of antipsychotics.** *Annals of the American Psychotherapy Association* 2011, **14:**70.
45. Greenwood RS: **Adverse effects of antiepileptic drugs.** *Epilepsia* 2000, **41:**S42-S52.
46. Isojärvi JI, Laatikainen TJ, Knip M, Pakarinen AJ, Juntunen KT, Myllyla VV: **Obesity and endocrine disorders in women taking valproate for epilepsy.** *Annals of neurology* 1996, **39:**579-584.
47. Morgan JI, Curran T: **Calcium and Proto-Oncogene Involvement in the Immediate-Early Response in the Nervous System.** *Annals of the New York Academy of Sciences* 1989, **568:**283-290.
48. Novak GP, Maytal J, Alshansky A, Eviatar L, Sy-Kho R, Siddique Q: **Risk of excessive weight gain in epileptic children treated with valproate.** *Journal of child neurology* 1999, **14:**490-495.
49. **World Health Organization** [http://www.who.int/growthref/who2007_bmi_for_age/en/]
50. IPAQ: **International Physical Activity Questionnaire.** November, 2005.
51. **IPAQ Scoring Protocol** [http://www.ipaq.ki.se/scoring.htm]
52. Trumbo P, Yates AA, Schlicker S, Poos M: **Dietary reference intakes: vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc.** *Journal of the American Dietetic Association* 2001, **101:**294-301.
53. Finkel R, Clark MA, Cubeddu LX: *Pharmacology*. Lippincott Williams & Wilkins; 2009.

54. Micronutrients IoMPo, Food IoM, Board N: *DRI, Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc: A Report of the Panel on Micronutrients...[et Al.], Food and Nutrition Board, Institute of Medicine.* National Academies Press; 2001.
55. Johnson CR, Handen BL, Mayer-Costa M, Sacco K: **Eating habits and dietary status in young children with autism.** *Journal of Developmental and Physical Disabilities* 2008, **20:**437-448.
56. Hyman SL, Stewart PA, Schmidt B, Lemcke N, Foley JT, Peck R, Clemons T, Reynolds A, Johnson C, Handen B: **Nutrient intake from food in children with autism.** *Pediatrics* 2012, **130:**S145-S153.
57. Lindsay RL, Eugene Arnold L, Aman MG, Vitiello B, Posey DJ, McDougle CJ, Scahill L, Pachler M, McCracken JT, Tierney E: **Dietary status and impact of risperidone on nutritional balance in children with autism: a pilot study.** *Journal of Intellectual and Developmental Disability* 2006, **31:**204-209.
58. Kočovská E, Fernell E, Billstedt E, Minnis H, Gillberg C: **Vitamin D and autism: clinical review.** *Research in developmental disabilities* 2012, **33:**1541-1550.
59. Stewart C, Latif A: **Symptomatic nutritional rickets in a teenager with autistic spectrum disorder.** *Child: care, health and development* 2008, **34:**276-278.
60. Noble JM, Mandel A, Patterson MC: **Scurvy and rickets masked by chronic neurologic illness: revisiting "psychologic malnutrition".** *Pediatrics* 2007, **119:**e783-e790.
61. Clark JH, Rhoden DK, Turner DS: **Symptomatic vitamin A and D deficiencies in an eight-year-old with autism.** *Journal of Parenteral and Enteral Nutrition* 1993, **17:**284-286.
62. Poskitt E, Cole T, Lawson D: **Diet, sunlight, and 25-hydroxy vitamin D in healthy children and adults.** *British Medical Journal* 1979, **1:**221.
63. Holick MF: **Photosynthesis of vitamin D in the skin: effect of environmental and life-style variables.** In *Federation proceedings*1987: 1876-1882.
64. Chambers JG, Shkolnik J, Pérez M: **Total Expenditures for Students with Disabilities, 1999-2000: Spending Variation by Disability. Report. Special Education Expenditure Project (SEEP).** 2003.
65. Johnson E, Hastings RP: **Facilitating factors and barriers to the implementation of intensive home-based behavioural intervention for young children with autism.** *Child: Care, Health and Development* 2002, **28:**123-129.
66. Liptak GS, Stuart T, Auinger P: **Health care utilization and expenditures for children with autism: data from US national samples.** *Journal of Autism and Developmental Disorders* 2006, **36:**871-879.
67. Järbrink K, Knapp M: **The economic impact of autism in Britain.** *Autism* 2001, **5:**7-22.
68. Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J: **Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities.** *Environmental health perspectives* 2002, **110:**721.
69. Billstedt E: **Autism and Asperger syndrome: coexistence with other clinical disorders.** *Acta Psychiatrica Scandinavica* 2000, **102:**321-330.

70. Ahearn WH, Castine T, Nault K, Green G: **An assessment of food acceptance in children with autism or pervasive developmental disorder-not otherwise specified.** *Journal of autism and developmental disorders* 2001, **31:**505-511.
71. Williams KE, Gibbons BG, Schreck KA: **Comparing selective eaters with and without developmental disabilities.** *Journal of Developmental and Physical Disabilities* 2005, **17:**299-309.
72. Schreck KA, Williams K: **Food preferences and factors influencing food selectivity for children with autism spectrum disorders.** *Research in developmental disabilities* 2006, **27:**353-363.
73. Matson JL, Fodstad JC: **The treatment of food selectivity and other feeding problems in children with autism spectrum disorders.** *Research in Autism Spectrum Disorders* 2009, **3:**455-461.
74. Ledford JR, Gast DL: **Feeding Problems in Children With Autism Spectrum Disorders A Review.** *Focus on Autism and Other Developmental Disabilities* 2006, **21:**153-166.
75. Rogers LG, Magill-Evans J, Rempel GR: **Mothers' challenges in feeding their children with autism spectrum disorder—Managing more than just picky eating.** *Journal of Developmental and Physical Disabilities* 2012, **24:**19-33.
76. Kochhar P, Batty M, Liddle E, Groom M, Scerif G, Liddle P, Hollis C: **Autistic spectrum disorder traits in children with attention deficit hyperactivity disorder.** *Child: care, health and development* 2011, **37:**103-110.
77. Lee DO, Ousley OY: **Attention-deficit hyperactivity disorder symptoms in a clinic sample of children and adolescents with pervasive developmental disorders.** *Journal of Child & Adolescent Psychopharmacology* 2006, **16:**737-746.
78. Nadon G, Feldman DE, Dunn W, Gisel E: **Mealtime problems in children with autism spectrum disorder and their typically developing siblings: A comparison study.** *Autism* 2011, **15:**98-113.
79. Panksepp J: **A neurochemical theory of autism.** *Trends in Neurosciences* 1979, **2:**174-177.
80. Reichelt K, Hole K, Hamberger A, Saelid G, Edminson P, Braestrup C, Lingjaerde O, Ledaal P, Orbeck H: **Biologically active peptide-containing fractions in schizophrenia and childhood autism.** *Advances in biochemical psychopharmacology* 1980, **28:**627-643.
81. Reichelt K, Knivsberg A, Nødland M, Lind G: **Nature and consequences of hyperpeptiduria and bovine casomorphins found in autistic syndromes.** *Developmental Brain Dysfunction* 1994.
82. Reichelt KL, Knivsberg A-M, Lind G, Nødland M: **Probable etiology and possible treatment of childhood autism.** *Brain Dysfunction* 1991.
83. Shattock P, Kennedy A, Rowell F, Berney T: **Role of neuropeptides in autism and their relationships with classical neurotransmitters.** *Brain Dysfunction* 1990.
84. Wakefield AJ, Murch SH, Anthony A, Linnell J, Casson D, Malik M, Berelowitz M, Dhillon AP, Thomson MA, Harvey P: **RETRACTED: Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children.** *The Lancet* 1998, **351:**637-641.

85. Whiteley P, Rodgers J, Savery D, Shattock P: **A gluten-free diet as an intervention for autism and associated spectrum disorders: preliminary findings.** *Autism* 1999, **3:**45-65.
86. Millward C, Ferriter M, Calver S, Connell-Jones G: **Gluten-and casein-free diets for autistic spectrum disorder.** *Cochrane Database Syst Rev* 2008, **2**.
87. Burkitt D, Walker A, Painter NS: **Effect of dietary fibre on stools and transit-times, and its role in the causation of disease.** *The Lancet* 1972, **300:**1408-1411.
88. Spiller R: **Pharmacology of dietary fibre.** *Pharmacology & therapeutics* 1994, **62:**407-427.
89. Morais MB, Vítolo MR, Aguirre AN, Fagundes-Neto U: **Measurement of low dietary fiber intake as a risk factor for chronic constipation in children.** *Journal of pediatric gastroenterology and nutrition* 1999, **29:**132-135.
90. Bernstein JG: **Induction of obesity by psychotropic drugs.** *Annals of the New York Academy of Sciences* 1987, **499:**203-215.
91. Allison DB, Fontaine KR, Heo M, Mentore JL, Cappelleri JC, Chandler LP, Weiden PJ, Cheskin LJ: **The distribution of body mass index among individuals with and without schizophrenia.** *Journal of Clinical Psychiatry* 1999.
92. Beasley Jr CM, Tollefson GD, Tran PV: **Safety of olanzapine.** *The Journal of clinical psychiatry* 1996, **58:**13-17.
93. Stanton JM: **Weight gain associated with neuroleptic medication: a review.** *Schizophrenia bulletin* 1995, **21:**463.
94. Kando JC, Shepski JC, Satterlee W, Patel JK, Reams SG, Green AI: **Olanzapine: a new antipsychotic agent with efficacy in the management of schizophrenia.** *Annals of Pharmacotherapy* 1997, **31:**1325-1334.
95. Allison DB, Mentore JL, Heo M, Chandler LP, Cappelleri JC, Infante MC, Weiden PJ: **Antipsychotic-induced weight gain: a comprehensive research synthesis.** *American journal of Psychiatry* 1999, **156:**1686-1696.
96. Isojärvi JI, Rättyä J, Myllylä VV, Knip M, Koivunen R, Pakarinen AJ, Tekay A, Tapanainen JS: **Valproate, lamotrigine, and insulin-mediated risks in women with epilepsy.** *Annals of neurology* 1998, **43:**446-451.
97. Mattson RH, Cramer JA, Collins JF: **A comparison of valproate with carbamazepine for the treatment of complex partial seizures and secondarily generalized tonic–clonic seizures in adults.** *New England Journal of Medicine* 1992, **327:**765-771.
98. Nicolaidou P, Georgouli H, Kotsalis H, Matsinos Y, Papadopoulou A, Fretzayas A, Syriopoulou V, Krikos X, Karantana A, Karpathios T: **Effects of anticonvulsant therapy on vitamin D status in children: prospective monitoring study.** *Journal of child neurology* 2006, **21:**205-210.
99. Rasalam A, Hailey H, Williams J, Moore S, Turnpenny P, Lloyd D, Dean J: **Characteristics of fetal anticonvulsant syndrome associated autistic disorder.** *Developmental Medicine & Child Neurology* 2005, **47:**551-555.
100. Christiansen C, Rødbro P, Sjö O: **"Anticonvulsant action" of vitamin D in epileptic patients? A controlled pilot study.** *British medical journal* 1974, **2:**258.
101. Ming X, Brimacombe M, Wagner GC: **Prevalence of motor impairment in autism spectrum disorders.** *Brain and Development* 2007, **29:**565-570.

102. Trost SG, Pate RR, Sallis JF, Freedson PS, Taylor WC, Dowda M, Sirard J: **Age and gender differences in objectively measured physical activity in youth.** *Medicine and science in sports and exercise* 2002, **34:**350-355.

APPENDICES

General Questionnaire

Number:

Birth Date:

Current weight and height of the child:

BMI:

Mother's education:

1 ( ) uneducated
2 ( ) primary school
3 ( ) high school
4 ( ) university
5 ( ) master / doctorate

Mother's occupation:

1 ( ) housewife
2 ( ) labourer
3 ( ) employee
4 ( ) marketer
5 ( ) freelance

Father's education:

1 ( ) uneducated
2 ( ) primary school
3 ( ) high school
4 ( ) university
5 ( ) master / doctorate

Father's occupation:

1 ( ) labourer
2 ( ) employee
3 ( ) marketer
4 ( ) freelance

Number of individuals in the family:

1 ( ) 3 pers. 2 ( ) 4-5 pers. 3 ( ) 6-7 pers. 4 ( ) 8+ pers.

Monthly income:

1 ( ) 500-1200 TL 2 ( ) 1200-2000 TL 3 ( ) 2000-4000 TL

4 ( ) 4000-8000 TL 5 ( ) 8000 TL and above

Do market prices effect your food choices?: 1 ( ) yes 2 ( ) no

3 – Day Food Records

Week-day

Breakfast:

_____

_____

_____

_____

Snack:

_____

_____

Lunch:

_____

_____

_____

_____

Snack:

_____

_____

Dinner:

_____

_____

_____

_____

Snack:

_____

_____

Week-day

Breakfast:

_____

_____

_____

_____

Snack:

_____

_____

Lunch:

_____

_____

_____

_____

Snack:

_____

_____

Dinner:

_____

_____

_____

_____

Snack:

_____

_____

Weekend

Breakfast:

_____

_____

_____

_____

Snack:

_____

_____

Lunch:

_____

_____

_____

_____

Snack:

_____

_____

Dinner:

_____

_____

_____

_____

Snack:

_____

_____

Feeding Assessment Survey

1. **Does your child show any of the following behaviours during the meal time?**
   - ☐ vomiting
   - ☐ difficulty swallowing
   - ☐ refuses to eat
   - ☐ choking
   - ☐ limited volume/ not eating enough
   - ☐ refuses to swallow/ holds food in mouth
   - ☐ pica

2. **Does your child select food/ have selectivity issue?** ☐ yes ☐ no
   If yes, please specify the food(s): _____

3. **Does your child have a specific diet?** ☐ yes ☐ no
   If yes, please specify which diet: _____

4. **What is the reason of this specific diet?**
   - ☐ autism therapy
   - ☐ gain weight
   - ☐ lose weight
   - ☐ other health problems

5. **Why is your child applying this diet?**
   - ☐ doctor said so
   - ☐ dietitian said so
   - ☐ our (family) preference
   - ☐ child's preference

6. **How often does your child have a bowel movement?**
   - ☐ daily
   - ☐ every other day
   - ☐ other _____

Does he have issues with: constipation (hard stools) ☐ yes ☐ no
diarrhea (loose stools) ☐ yes ☐ no

7. **Please list your child's medications. (Include vitamins and supplements):**

Medications	Dose	How often

8. **Where does your child usually sit during mealtimes?**

☐ at the table ☐ on the couch ☐ stands ☐ in front of TV ☐ wanders around

9. **Where in the house is your child fed?**

☐ kitchen ☐ dining room ☐ living room ☐ walking around

10. **With whom does your child usually eat/ drink?**

☐ alone ☐ with parents ☐ with siblings ☐ with peers ☐ caretaker

11. **Who feeds your child?**

☐ mother ☐ father ☐ sibling ☐ grandparent ☐ caretaker ☐ teacher/ therapist ☐ himself

12. **How much 'water' does your child drink per day?**

☐ 0 – 250 ml
☐ 250 – 500 ml
☐ 500 – 750 ml
☐ 750 – 1000 ml
☐ 1000 – 1500 ml
☐ > 1500 ml

13. **Who cooks in the house?**

☐ mother ☐ father ☐ siblings ☐ grandparents ☐ caretaker

IPAQ (International Physical Activity Questionnaire)

PART 1: TRANSPORTATION PHYSICAL ACTIVITY

1. **During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car or tram?**

   _____ days per week

   _____ none

2. **How much time did you usually spend on one of those days traveling in a car, bus, train or other kind of motor vehicle?**

   _____ hours per day

   _____ minutes per day

3. **During the last 7 days, on how many days did you bicycle to go from place to place?**

   _____ days per week

   _____ none

4. **How much time did you usually spend on one of those days to bicycle from place to place?**

   _____ hours per day

   _____ minutes per day

5. **During the last 7 days, on how many days did you walk to go from place to place?**

   _____ days per week

   _____ none

6. **How much time did you usually spend on one of those days walking from place to place?**

   _____ hours per day

   _____ minutes per day

PART 2: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVIITY

7. **During the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?**

   _____ days per week

   _____ none

8. **How much time did you usually spend on one of those days walking in your leisure time?**

   _____ hours per day

   _____ minutes per day

9. **During the last 7 days, on how many days did you do vigorous physical activities in your leisure time?**

   _____ days per week

   _____ none

10. **How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?**

    _____ hours per day

    _____ minutes per day

11. **During the last 7 days, on how many days did you do moderate physical activities in your leisure time?**

    _____ days per week

    _____ none

12. **How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?**

    _____ hours per day

    _____ none

PART 3: TIME SPENT SITTING

13. During the last 7 days, how much time did you usually spend sitting on a weekday?

_____ hours per day

_____ minutes per day

14. During the last 7 days, how much time did you usually spend sitting on a weekend day?

_____ hours per day

_____ none

Thank you for taking the time to complete all these questionnaires.

Dyt. Ayşe Hümeyra BİÇER

humeyra.bicer@gmail.com

0530 235 6631

PORSİYON KİTAPÇIĞI

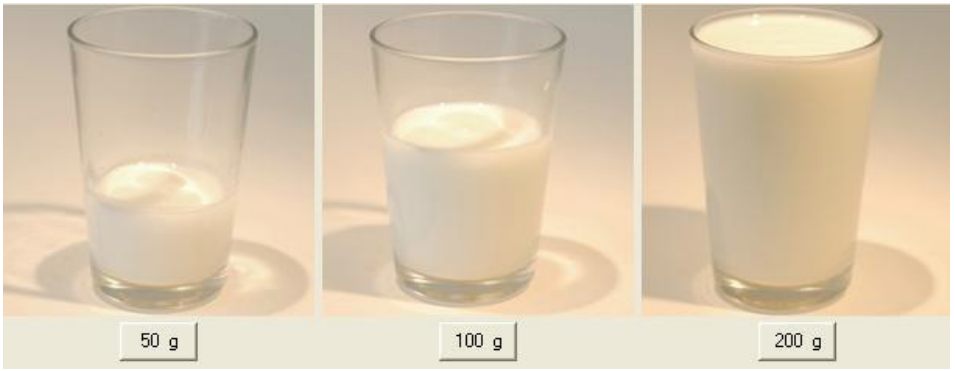
Derleyen: Ayşe Hümeyra BİÇER.

Yeditepe Üniversitesi – Beslenme ve Diyetetik Bölümü

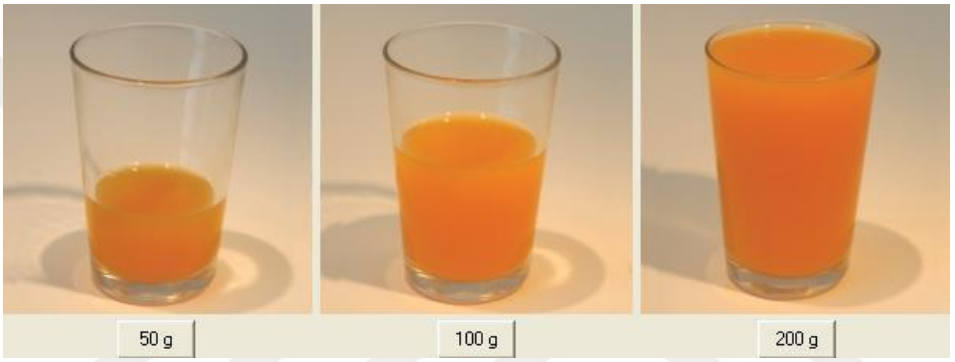
Kaynak: BeBiS (Beslenme Bilgi Sistemi)

SIVI GIDALAR

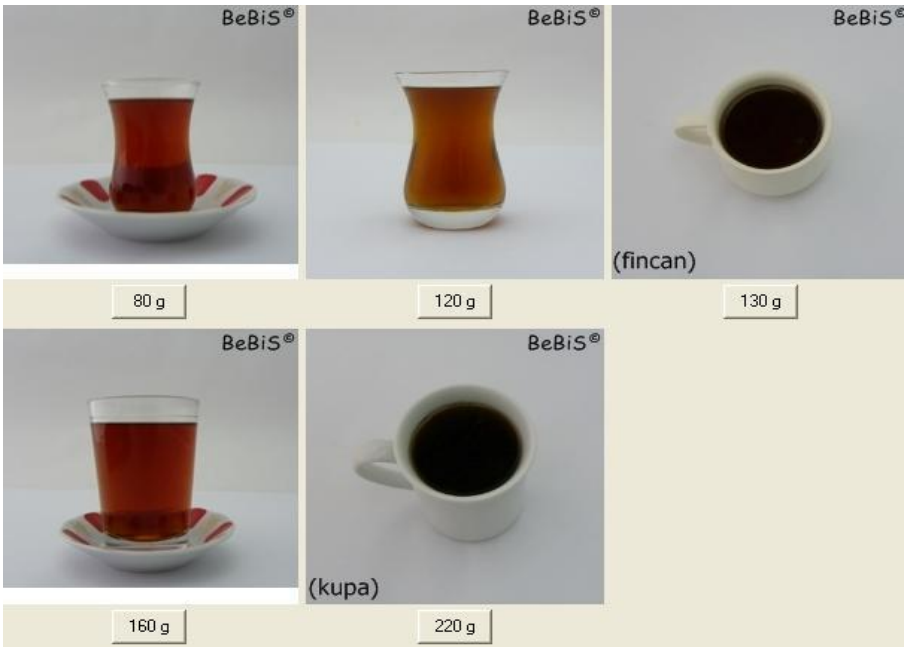
Ayran / Süt



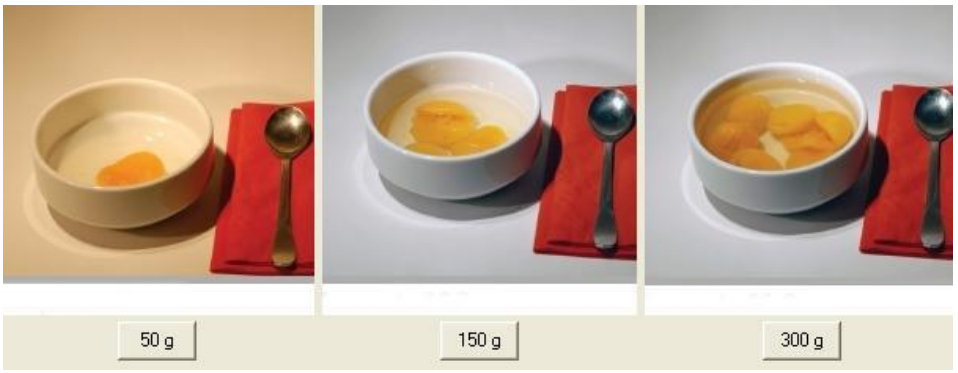
Meyve Suyu



Çay

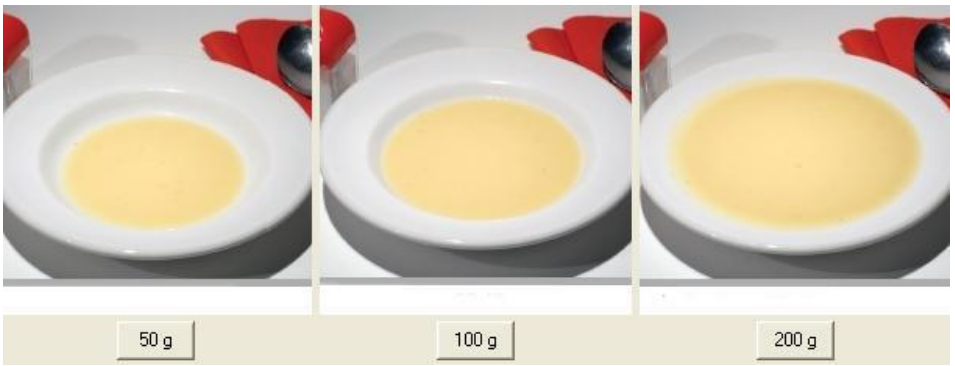


Komposto



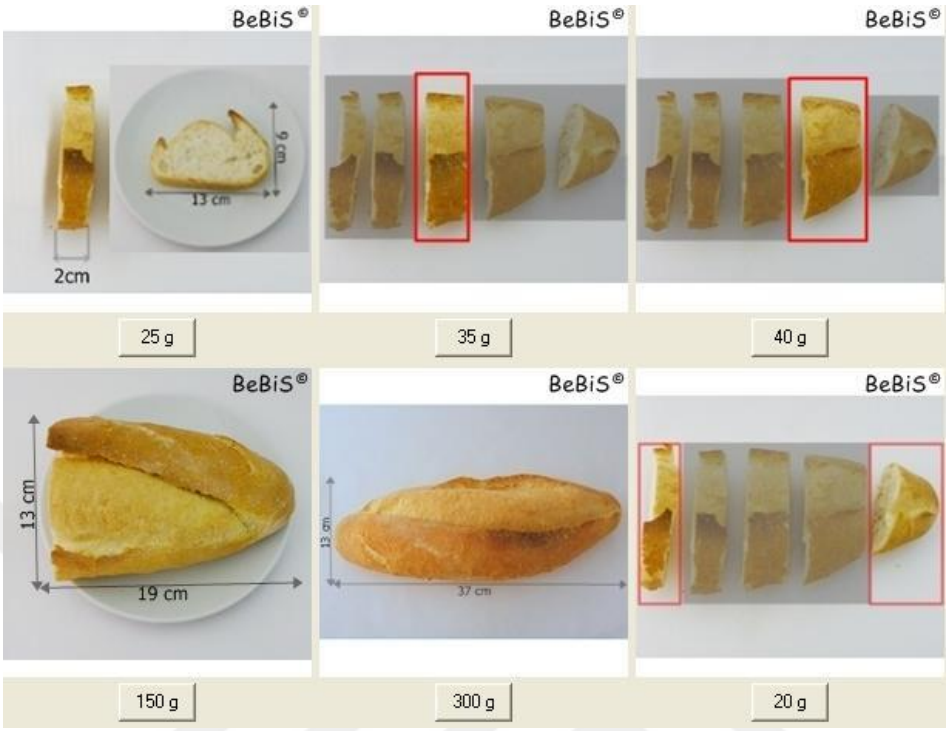
Yoğurt

Çorba

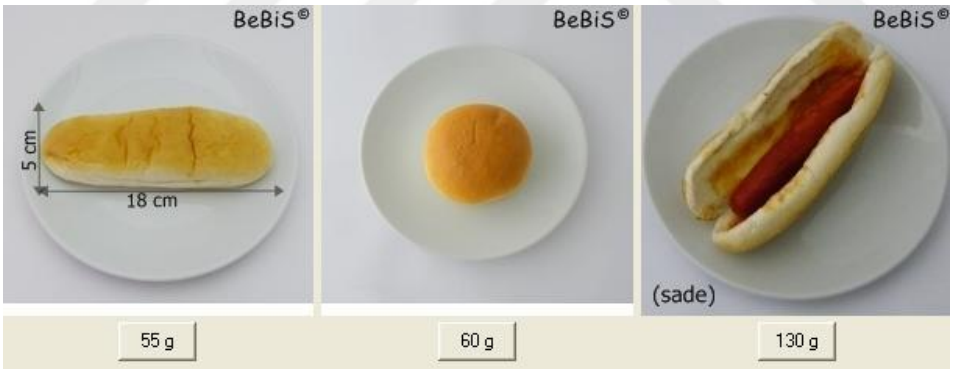


UNLU GIDALAR, TAHILLAR VE BAKLAGİLLER

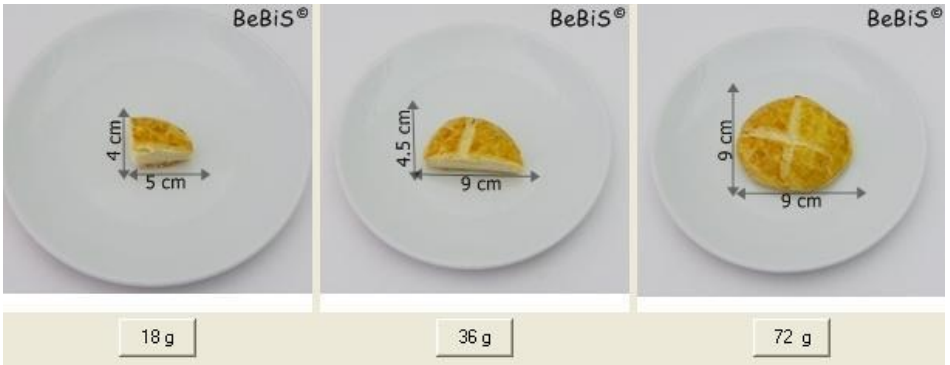
Ekmek



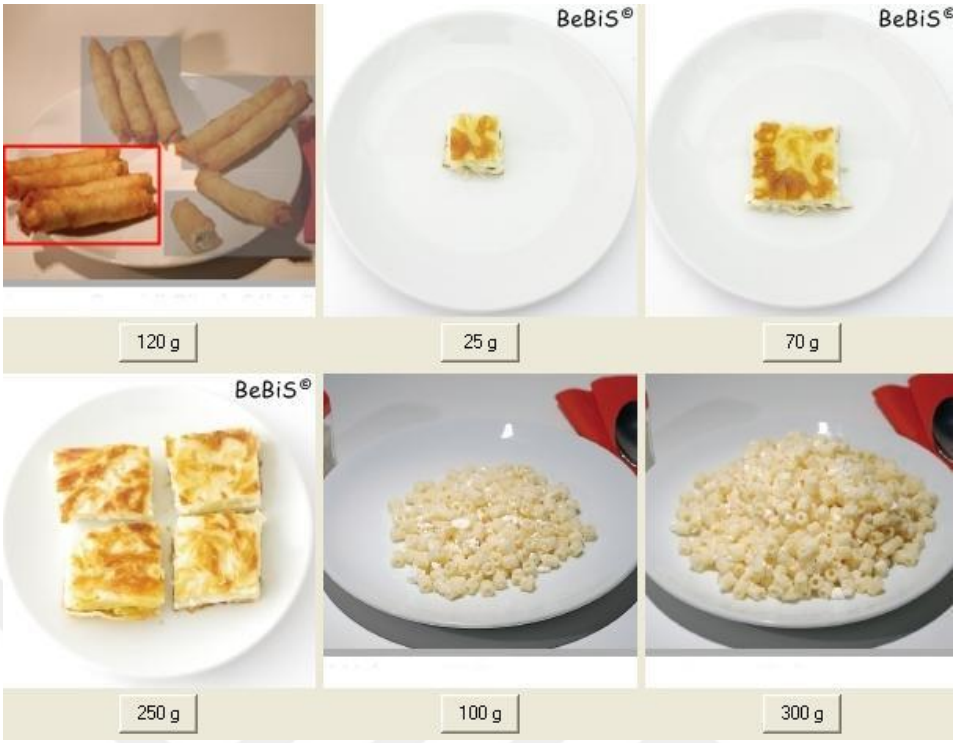
Sandviç Ekmeği



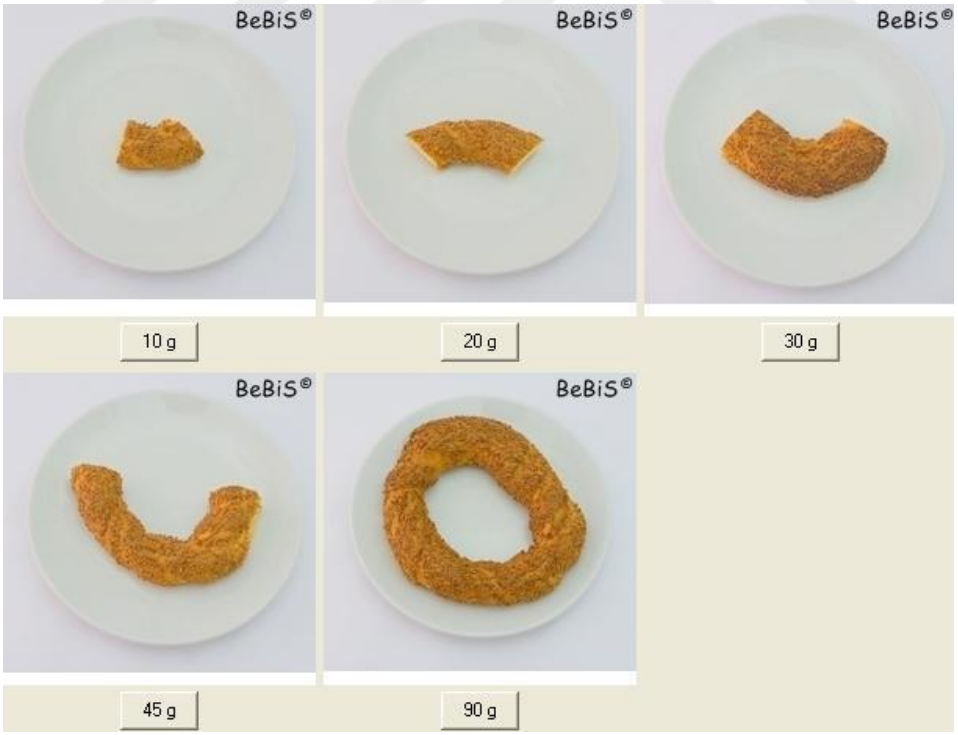
Poğaça



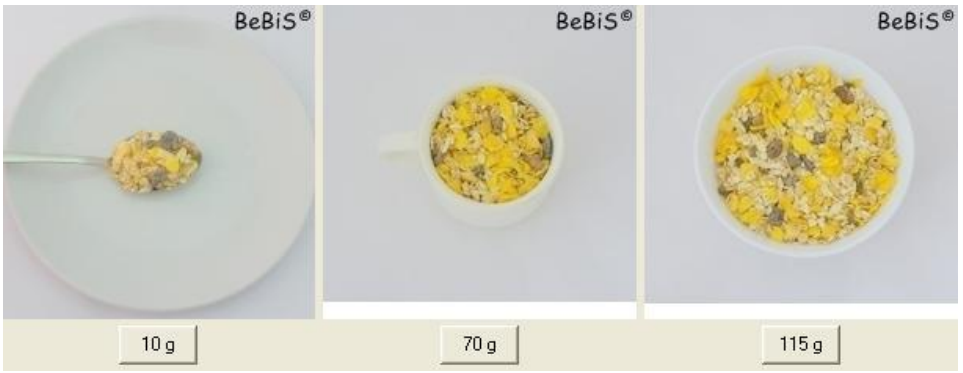
Peynirli Börek / Makarna



Simit

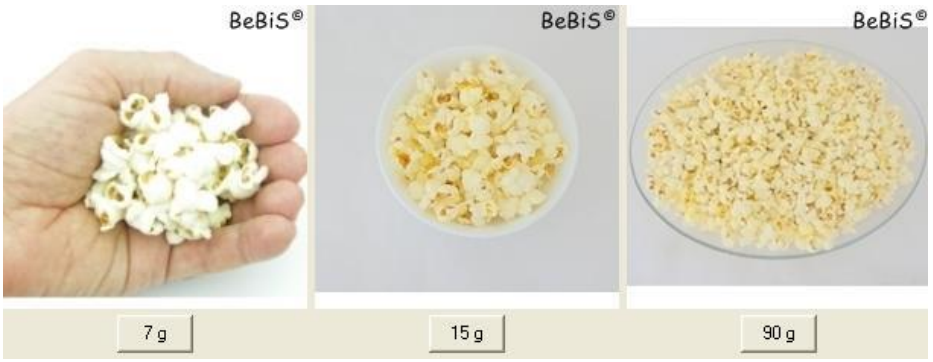


Müsli



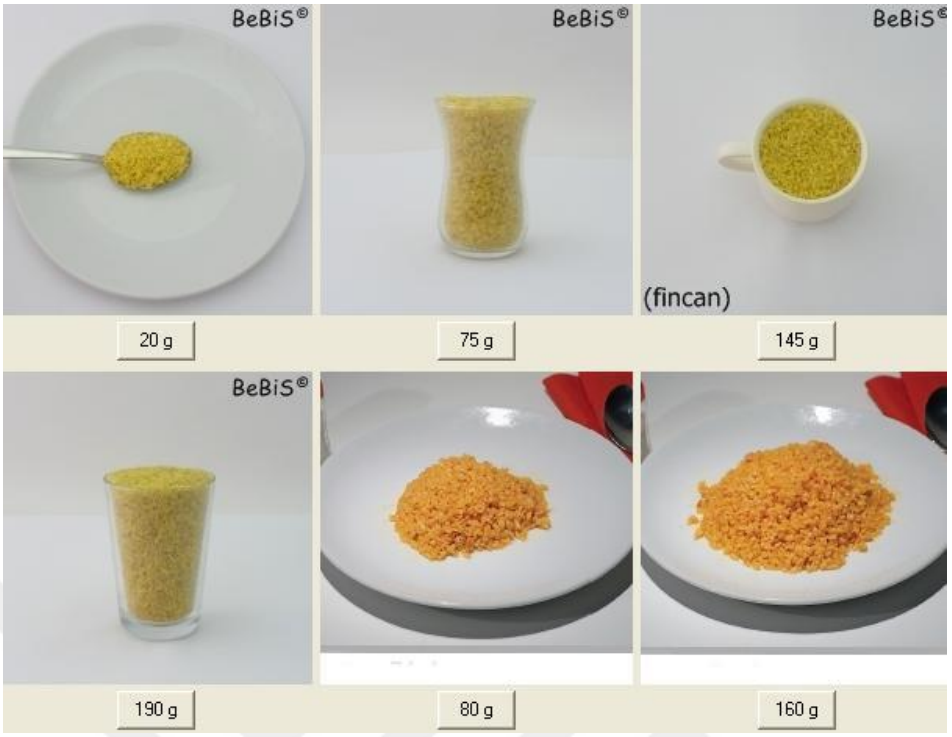
Mısır Gevreği

Patlamış Mısır

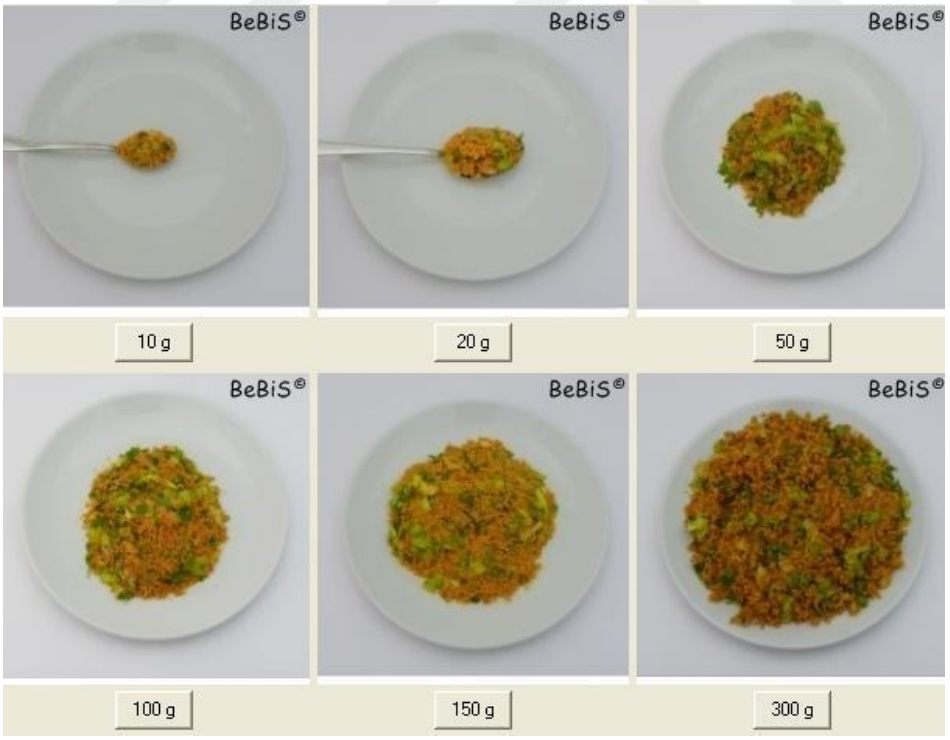


Pilav

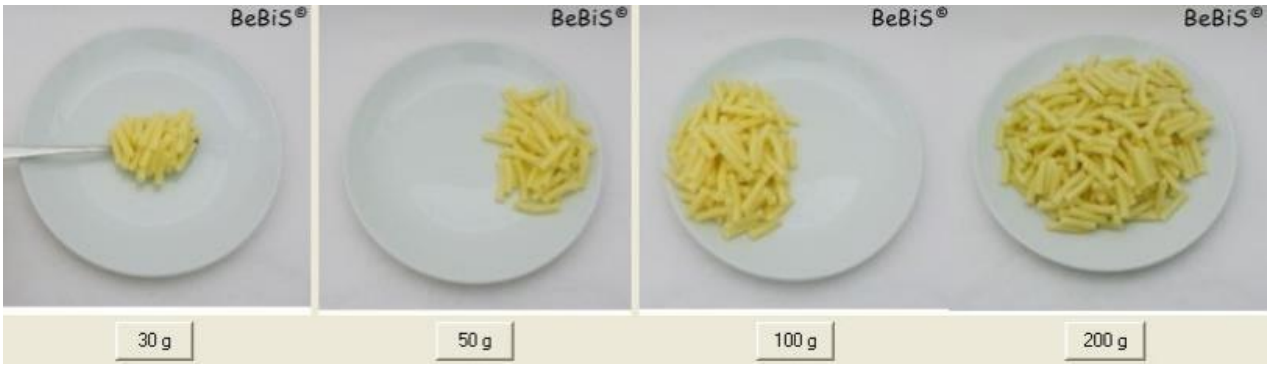
Bulgur / Bulgur Pilavı



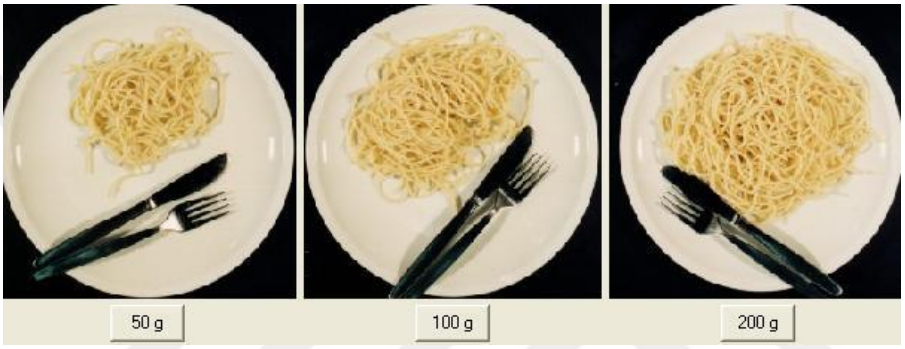
Kısır



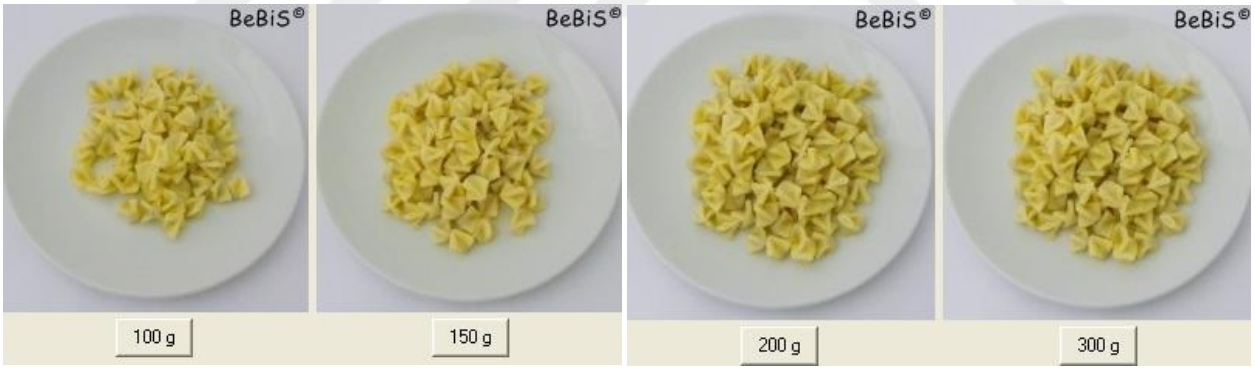
Makarna



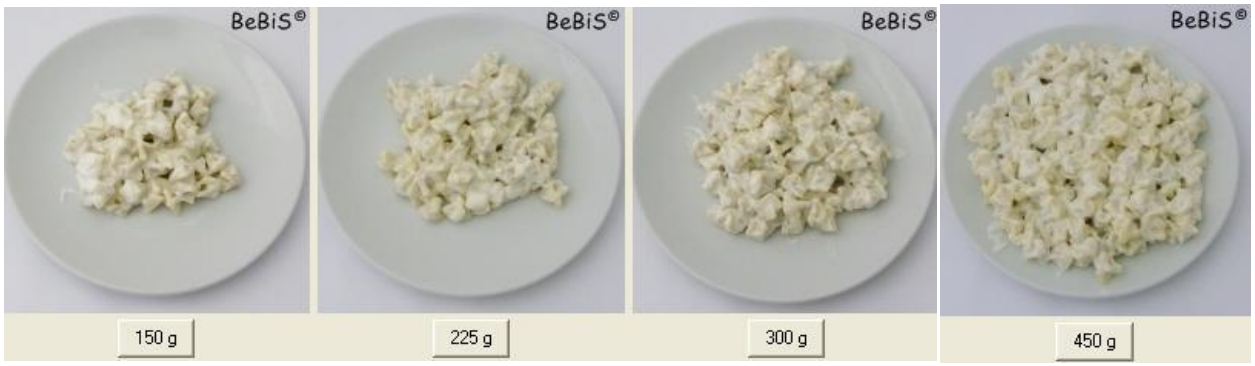
Spagetti



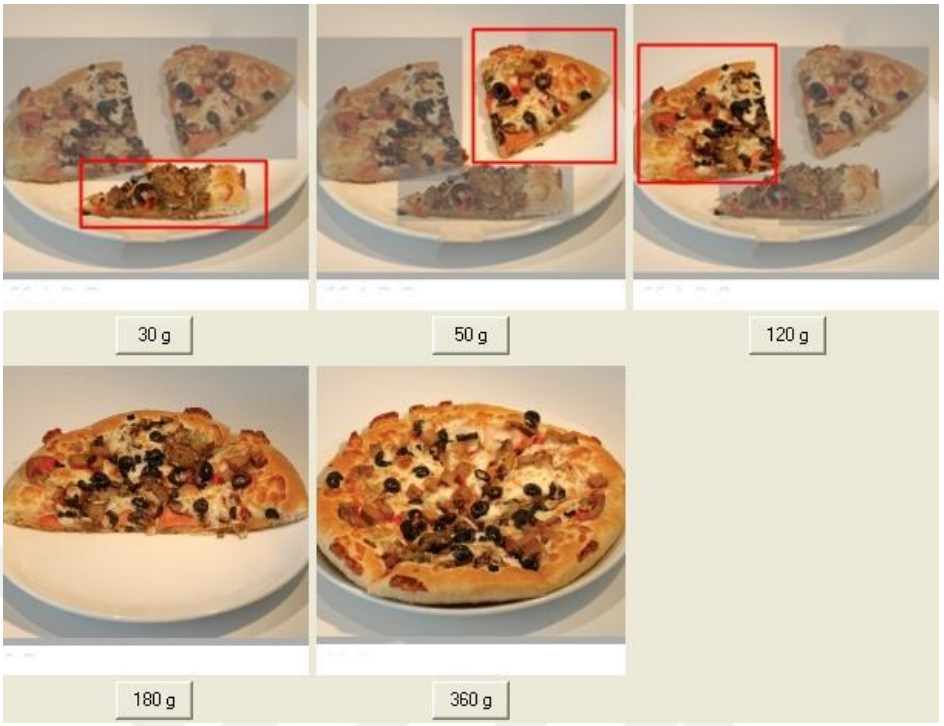
Sade Mantı



Yoğurtlu Mantı



Pizza

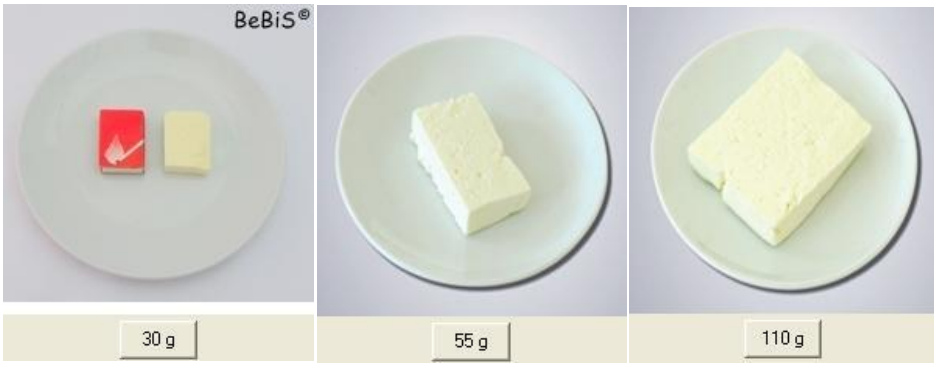


Sade Kurubaklagil

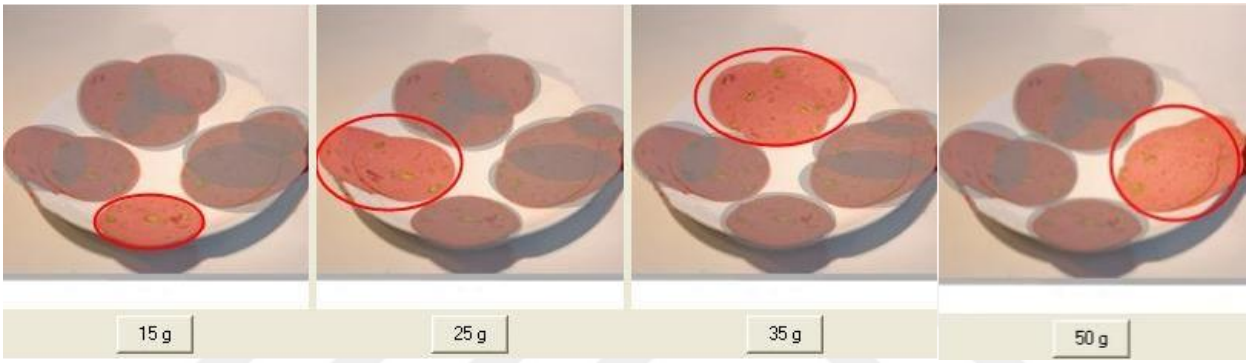
Etli Kurubaklagil

KAHVALTILIKLAR, ETLER VE ETLİ YEMEKLER

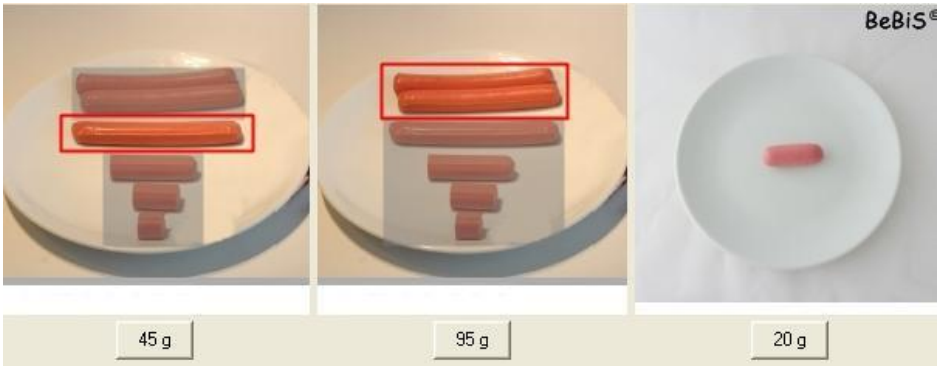
Peynir



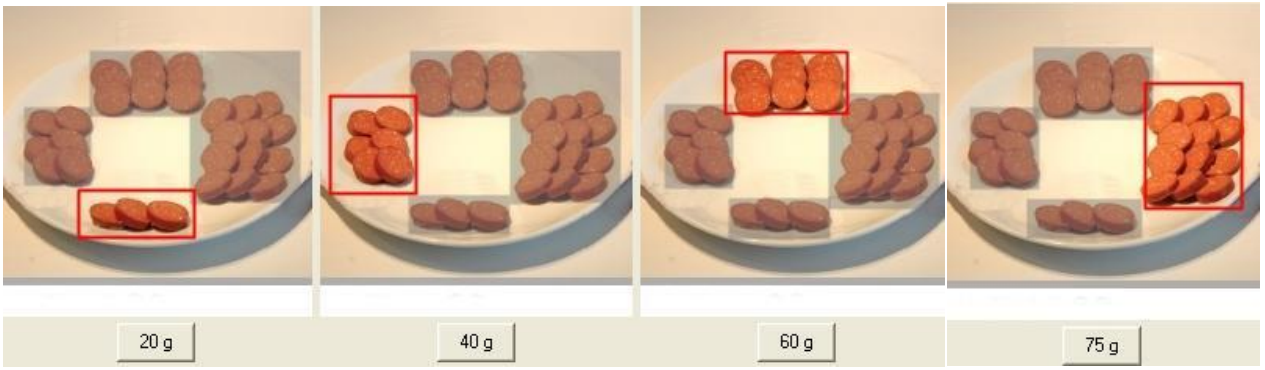
Salam



Sosis



Sucuk



Zeytin

Et

Haşlama Et

Et Sote

Ciğer Sote

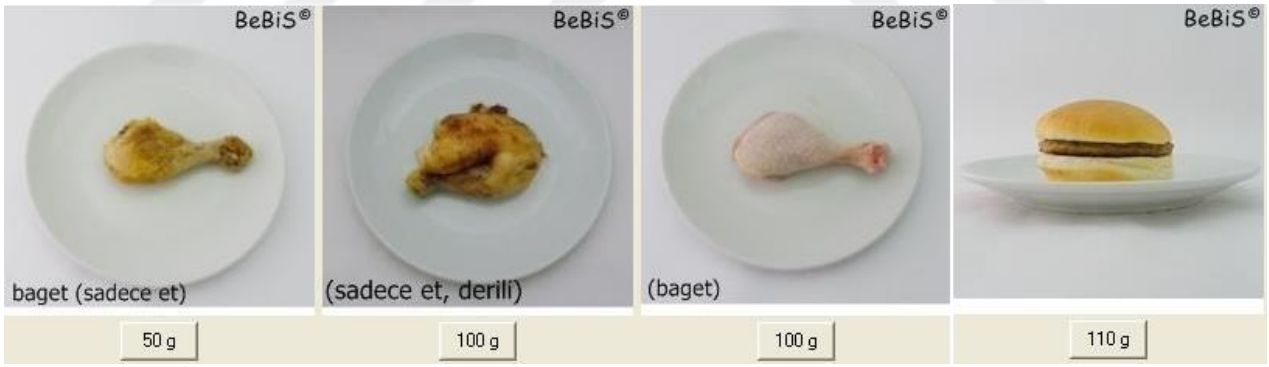
Fırın Köfte

Sulu Köfte

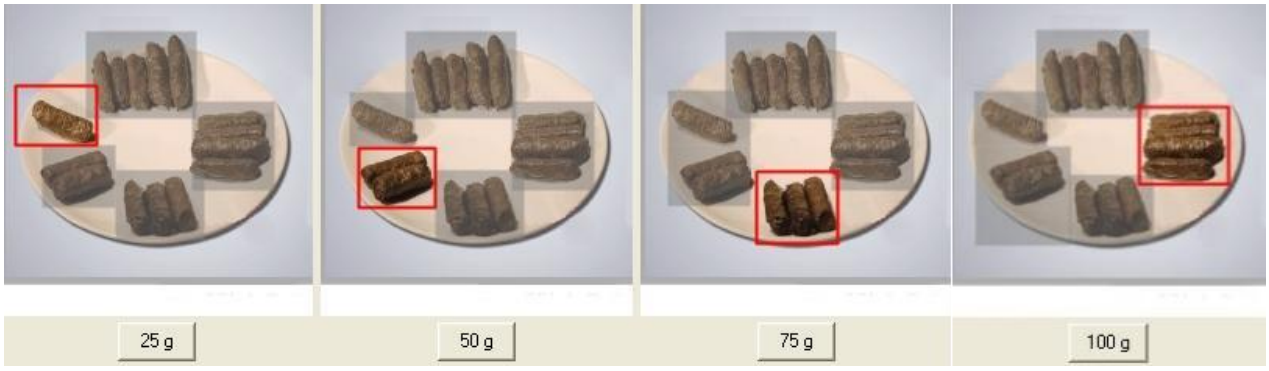
Etli Sebze Yemeği

Seblezli Et Yemeği

Tavuk / Hamburger



Yaprak Sarma



CURRICULUM VITAE

Personal Information

Name	Ayşe Hümeyra	**Surname**	BİÇER
Place of Bitrh	Üsküdar – İSTANBUL	**Date of Birth**	31.07.1988
Nationality	T.C.	**ID No**	34168967790
E-mail	humeyra.bicer@gmail.com	**Telephone**	0530 235 66 31

Education Status

	Name of the Schools	**Year of Graduation**
Undergraduation	Yeditepe University	2012
High-school	Arda Asalet	2006
Elementary School	Mihriban Suat Bedük İ.Ö.O.	2002

Working Experience

	Job	**Institution**	**Duration (Year - Year)**
1.	Research Assisstant	Marmara University	2014 -
2.	Bursiyer Öğrenci	Yeditepe Üniversitesi	2012 - 2014
3.	Dietitian	ADA Autism Rehab Center	2012
4.	Student Assistant	Yeditepe University	2011 - 2012

Foreign Languages	**Reading**	**Speaking**	**Writing**	**KPDS/ÜDS Scores**
English	Very good	Very good	Very good	85
Italian	Moderate	Weak	Moderate	

Computer Knowledge

Program	**Usage**
Office Programs	Very good
Windows Operating Systems	Very good