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Portion measurement perception and its effects on obesity*

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* This article is prepared from Duygu Merve UÇAR PİŞGİN's master thesis.

Abstract

The portion sizes consumed at home and outside are increasing. The large plate and excessive amount of food placed on the plate affects the amount consumed. The aim of this study is to examine the portion size and plate size that affect energy intake together. This descriptive cross-sectional study was conducted on 265 people aged 18-60 years between October-December 2018 in a private site located in Başakşehir district of Istanbul. 62.6% of the individuals who participated in the study were women and 37.42% were men. The research data were collected by a questionnaire form prepared by the researcher using the literature. In addition, visuals related to plate and portion size are given in detail in the method section. As a result of

the research there was a statistically significant relationship between the selected portion amount and gender ($p < 0.05$). There was no statistically significant difference between body mass index (BMI), skipping meal status, eating speed and regular exercise and the amount of portion selected ($p > 0.05$). There was a statistically significant difference between plate size and BMI ($p < 0.05$). No statistically significant relationship was found between gender, meal skipping, eating speed and regular sporting and plate size ($p > 0.05$). As a result, portion amount and plate size are thought to have an effect on body weight management.

Keywords: *portion amount, plate size, obesity, visual perception.*

1. INTRODUCTION

Nutrition is the use of nutrients for growth, maintenance of life and protection of health. Nutrition is one of the most important human needs **(1)**. In order for a person to survive as a healthy individual, nutrition must be sufficient and balanced. According to the World Health Organization (WHO), obesity is defined as abnormal or excessive fat accumulation that poses a risk to health **(2)**. The rapid increase in obesity prevalence over the last 30 years is mainly a result of cultur-

al and environmental impacts. Eating disorders with high energy density, increased portion size, low physical activity and the adoption of sedentary lifestyle are considered important risk factors for the development of obesity **(3)**

Today, consumed portion amounts are not taken into consideration because of the limited time they devote to food, easy access to ready-to-eat foods with high energy values, and the desire to eat foods that are high in energy. Portion size is an important

environmental factor of energy intake, and consuming more than ideal portion sizes of food causes an increase in body weight. Numerous acute, well-controlled laboratory studies, supported by data from free living conditions, have shown that portion size has a strong and proportional effect on the amount of food consumed **(4)**. Portion sizes on the market have been shown to increase over time in the United States, Europe and Australia. Population-based studies show an increase in overweight and obesity levels as the portion sizes served inside and outside the home increase. In 2014, WHO suggested that restricted portion sizes could reduce the risk of unhealthy body weight gain to reduce total energy intake **(5)**.

Although studies on portion size generally show a relationship between portion size and body weight increase, there is no direct causality. The reason is that most of the studies are short-term and the products with increased portion amounts have high energy density.

In this study, it is aimed to determine whether the size of the plates and the amount of food in the plates are effective on individuals, which are thought to be related to the excessive food consumption of individuals.

2. MATERIALS AND METHODS

This descriptive cross-sectional study was conducted on 265 people aged 18-60 years between October-December 2018 in a private site located in Başakşehir district of Istanbul. For the research, 'Ethics Committee Approval' from Istanbul Okan University, permission from the site administration where the research was conducted, and 'Informed Consent Form' was obtained from the individuals to be surveyed. Data collection was done by the researcher using the face to face questionnaire method prepared

by the researcher using the literature. The first part of the questionnaire consists of eight questions about personal information and learning the socio-demographic and anthropometric characteristics of individuals. In the second part, there are 18 questions about nutrition and lifestyle. At the end of the survey, there are two main questions supported by photographic visuals prepared by the researcher (Annex 1). Anthropometric measurements in the first part of the questionnaire were learned by asking individuals. The preparation of the plates in the images was mainly based on adequate and balanced nutrition. When portioning food, data have been used in Turkey Nutrition Guide **(6)**. Food weighing was done with Tefal Easy Steel Digital Kitchen Scale. In the first image, a plate with a diameter of 25 cm was used. The amount of nutrients in the plates was varied and adjusted in half portions, one portion and one and a half portions. In the second image he used plates of 25 cm, 20 cm and 19 cm in diameter in three different sizes. The amount of nutrients in these dishes was adjusted to one portion size and kept in the same amount in all of them. Menu images were taken with a digital camera in a bright environment. SPSS 22.0 statistical package program was used for statistical analysis. In comparison of categorical data, Pearson Chi-Square test and Fisher Exact test were applied and the results were evaluated with 95% confidence interval and $p < 0.05$ significance level. The normality test of the quantitative data was tested by Kolmogorov-Smirnov test and the comparison of the data was evaluated by Kruskal Wallis test.

3. RESULTS

The age of the participants ranged from 18 to 60 years. The average age was 36.2 ± 12.7 years. The height of the individuals

was minimum 145 cm, maximum 190 cm and the average length was 167.1 ± 8.5 cm. The weight of the individuals was minimum 37.2 kg, maximum 130 kg and the average is 73.3 ± 15.1 kg. 32.8% of individuals were high school graduates and 41.5% were university graduates. It was found that 58.1% of the individuals were employed and 41.9% were not employed in any job. 60.5% of the individuals participating in the study were married and 39.5% were single.

Table 1 shows the distribution of individuals according to their gender, portion size and plate size.

When **Table 1** is examined it is seen that 54.0% of the individuals chose one portion, 30.2% preferred half portion and

15.8% preferred one and a half portion plates. Looking at the distribution by sex, it is seen that 56.6% of the women and 49.5% of the men choose a plate with one portion of food. While 31.9% of the women chose the plate with half portion of food, 27.3% were men. 23.2% of men and 11.5% of women selected one and a half portion. There was a statistically significant relationship between the selected portion amount and gender ($p < 0.05$). When **Table 1** is analyzed according to the selected plate size, it is seen that the majority of the women (44.6%) chose the medium-sized plate, while the majority of the men (45.4%) chose the large plate. There was no statistically significant difference between plate size and gender ($p > 0.05$).

Portion amount	Gender				Total		χ^2	p
	Female		Male					
	S	% Column	S	% Column	S	% Column		
Half portion (Plate A)	53	31,9	27	27,3	80	30,2	6,362	0,042* *P<0,05
One portion (Plate B)	94	56,6	49	49,5	143	54,0		
One and a half portion (Plate C)	19	11,5	23	23,2	42	15,8		
Total	166	100,0	99	100,0	265	100,0		
Plate Size								
Small (Plate F)	33	19,9	16	16,2	49	18,4	2,642	0,267* *P>0,05
Medium (Plate E)	74	44,6	38	38,4	112	42,3		
Large (Plate D)	59	35,5	45	45,4	104	39,3		
Total	166	100,0	99	100,0	265	100,0		

Table 1: Distribution of individuals according to their gender, portion size and plate size.

Portion amount	n	Avg	S.S	Test statistics	P
Half portion (Plate A)	80	26,937	5,165	4,157	0,125* *p>0,05
One portion (Plate B)	143	25,645	4,927		
One and a half portion (Plate C)	42	27,276	5,027		
Plate Size					
Small (Plate F)	49	26,302	4,871	7,166	0,028* *p<0,05
Medium (Plate E)	112	25,912	4,908		
Large (Plate D)	104	25,941	5,134		

Table 2: distribution of individuals according to their BMI, portion size and plate size.

Table 2 shows the distribution of individuals according to their BMI, portion size and plate size.

As shown in **Table 2**, there was no statistically significant difference between the selected portion amount and BMI ($p > 0.05$). There was a statistically significant difference between BMI and plate size ($p < 0.05$). There was a significant difference between those who chose the large plate ($X^- = 25,941$) and those who chose the small plate ($X^- = 26,302$), and those who chose the middle plate ($X^- = 25,912$) and those who selected the small plate ($X^- = 26,302$).

Table 3 shows the distribution of individuals according to their meal skipping status, portion size and plate size.

The majority of the participants (54.1%) who stated that they skipped meals chose the plate with one portion. Those who chose the plate with half and one and a half portions of food were 32.1% and 13.8% respectively. There was no statistically significant difference between individuals' skipping status and portion amount ($p > 0.05$). There was no statistically significant difference between the skipping status and the plate size ($p > 0.05$).

Portion amount	Meal Skipping Status				χ^2	P
	Does skip		Does not skip			
	S	% Column	S	% Column		
Half portion (Plate A)	58	32,1	22	26,2	3,166	0,205 p>0,05
One portion (Plate B)	98	54,1	45	53,6		
One and a half portion (Plate C)	25	13,8	17	20,2		
Total	181	100,0	84	100,0		
Plate Size						
Small (Plate F)	34	18,8	15	17,9	0,173	0,917 p>0,05
Medium (Plate E)	76	42,0	36	42,9		
Large (Plate D)	71	39,2	33	39,2		
Total	181	100,0	84	100,0		

Table 3: Distribution of individuals according to their meal skipping status, portion size and plate size

Portion amount	Eating Speed						χ^2	p
	Slow		Medium		Fast			
	S	% Column	S	% Column	S	% Column		
Half portion (Plate A)	14	41,2	38	31,4	28	25,7	4,835	0,305 p>0,05
One portion (Plate B)	17	50,0	66	54,5	59	54,1		
One and a half portion (Plate C)	3	8,8	17	14,1	22	20,2		
Total	34	100,0	121	100,0	109	100,0		
Plate Size								
Small (Plate F)	5	14,7	19	15,7	25	22,9	3,987	0,408 p>0,05
Medium (Plate E)	15	44,1	57	47,1	40	36,7		
Large (Plate D)	14	41,2	45	37,2	44	40,4		
Total	34	100,0	121	100,0	109	100,0		

Table 4: Distribution of individuals according to their eating speed, portion selection and plate size.

When **Table 4** is examined, it is seen that there is no statistically significant difference between eating speed, portion amount and the plate size ($p > 0.05$, $p > 0.05$).

Table 5 shows the distribution of individuals according to their regular sporting status, portion size and plate size.

There is no statistically significant difference between regular sporting, portion size and plate size ($p > 0.05$, $p > 0.05$).

Portion amount	Regular Sporting Status				χ^2	p
	Yes		No			
	S	% Column	S	% Column		
Half portion (Plate A)	28	27,2	53	32,7	1,589	0,452 p>0,05
One portion (Plate B)	60	58,3	81	50,0		
One and a half portion (Plate C)	15	14,5	28	17,3		
Total	103	100,0	162	100,0		
Plate Size						
Small (Plate F)	20	19,4	30	18,5	0,178	0,915 p>0,05
Medium (Plate E)	42	40,8	70	43,2		
Large (Plate D)	41	39,8	62	38,3		
Total	103	100,0	162	100,0		

Table 5: Distribution of Individuals according to their regular sporting status, amount of portion they choose and plate size.

4. DISCUSSION

Environmental factors associated with the outbreak of obesity are gaining increasing interest. One of the most studied areas of the eating environment is the effect of changing portion sizes on eating behavior. In food and beverage establishments around the world, portion sizes are larger than in the past and considerably higher than national standard portion sizes. In addition, household survey analyzes report that individuals also eat and drink at home with larger serving sizes than they did in the past. Numerous studies in the literature have revealed that the portion size presented increases the amount of intake with remarkable consistency in both children and adults **(7, 8, 9)**.

In a 4-day study on adults, it was found that men consumed more than women and women were more effective in deciding the standard portion sizes than men **(10)**. In a study conducted with high school students in our country, it was found that male students generally chose the large size menu and female students chose the small size menu **(11)**. According to the results of the research it is seen that 54.0% of the individuals preferred one portion, 30.2% preferred half portion and 15.8% preferred one and a half portion food. The frequency of males choosing one and a half portion is 23.2% and 11.5% for women. A statistically significant relationship was found between the selected portion amount and gender ($p < 0.05$) **(table 1)**. These findings are thought to arise from the idea that males can meet larger energy needs, at least in part through larger portion sizes.

It is emphasized that plate size may have an effect on the amount of food consumed. Studies show that the food consumed by individuals increases with increasing plate size. Apart from the size of the plate, it was

observed that the edge of the plate and the width of that edge affects food consumption. It is stated that this is caused by visual illusion in individuals. However, some studies have not found a significant relationship between plate size and the amount of food consumed. This is due to factors affecting appetite and duration of the study. The reasons such as having individuals in a certain environment while study, changes in the state of hunger and satiety at the time of the study, the short duration of some studies, and the uncertainty whether increased nutrient consumption persists after the study are the factors that prevent the subject from gaining clarity **(12, 13, 14, 15)**. When the results of the research were analyzed according to the selected plate size, it was seen that the majority of the women (44.6%) chose the medium-sized plate, while the majority of the men (45.4%) chose the large plate. There was no statistically significant difference between plate size and gender ($p > 0.05$) **(table 1)**.

High energy value of meal causes weight gain in individuals. BMI values increase with increasing body weight. In a study conducted on university students, no significant relationship was found between BMI value and portion perception **(16)**. In a study on snacks, it was stated that although there was a significant relationship between BMI and portion sizes of snacks with some varieties, further studies were needed on the subject **(17)**. In another study, a significant relationship was found between BMI and portion size **(18)**. In the study, there was no statistically significant difference between the selected portion amount and BMI ($p > 0.05$). There was a statistically significant difference between BMI and plate size ($p < 0.05$). It was determined that there was a significant difference between those who

chose the large plate ($X^- = 25,941$) and those who chose the small plate ($X^- = 26,302$), and who selected the middle plate ($X^- = 25,912$) and those who selected the small plate ($X^- = 26,302$) (**table 2**).

The frequency and timing of meals are important aspects of nutrition. Excessive energy intake increases the risk of obesity and chronic disease. Eating more often is often suggested as a slimming strategy. It is presumed to reduce hunger and thus energy intake and body weight. Some studies have shown that eating at night may adversely affect slimming status. In addition, it was observed that having regular breakfast can decrease the absolute energy intake during the day and provide protection against body weight increase (**19**). The fact that women are more involved in cooking at home and being more careful about diet may cause a difference between the genders (**20**). In a study conducted with 300 adult individuals, it was found that there was a difference between genders in terms of the number of meals (**21**). The majority of the participants (54.1%) who stated that they skipped meals chose the plate with one serving. Those who chose the plate with half and one and a half portions of food were 32.1% and 13.8% respectively. There was no statistically significant difference between individuals' skipping status and portion amount ($p > 0.05$). There was also no statistically significant difference between skipping status and plate size ($p > 0.05$) (**table 3**).

The amount of nutrients consumed per unit time, i.e. the eating speed, is highlighted for its potential role in the prevention and treatment of obesity. Slower eating is expected to reduce food intake and therefore body weight. The energy passing rapidly through the oral cavity does not provide a sufficient satiety response, which leads

to increased intake. Moreover, eating speed is a personal feature. Some people tend to eat faster than others. Therefore, eating speed can affect long-term energy intake and therefore body weight. In a study conducted in the Dutch population, participants were given apple, bread and vanilla pudding to measure their eating speed. As a result, it was found that males had a higher eating rate than females (**22**). As a result of the study, it was seen that there was no statistically significant difference between the food consumption speed and portion amount and the plate size ($p > 0.05$, $p > 0.05$) (**table 4**).

Regular physical activity and sport is important for the physical, social and spiritual health of individuals. Obesity is more common in sedentary people than in those with regular physical activity. It is stated that individuals who devote more time to inactive activities and do not do regular sports have problems with excessive body weight (**23**). In a study conducted in high school students, the BMI values of the students doing sports were lower than those who did not do sports (**24**). According to the results of the research, there is no statistically significant difference between regular sporting and portion amount and plate size ($p > 0.05$, $p > 0.05$) (**table 5**).

5. CONCLUSION AND RECOMMENDATIONS

Individuals paying attention to the amounts they consume have an effect on body weight. This indicates that individuals know the portion sizes that they should consume, providing a reduction in body weight and forming a healthy plate to reduce the effects of diseases seen with excess weight. It is assumed that an increased portion size of food may impair normal appetite control and promote overeating.

In this study, the effect of portion size and plate size on body weight was investigated in adults aged 18–60 years.

As a result of the research:

- A statistically significant relationship was found between the selected portion amount and gender ($p < 0.05$) (**table 1**).
- There was no statistically significant difference between the selected portion amount and BMI ($p > 0.05$). There was a statistically significant difference between BMI and plate size ($p < 0.05$) (**table 2**).
- There was no statistically significant difference between individuals' skipping meal status and portion amount ($p > 0.05$). There was also no statistically significant difference between meal skipping status and plate size ($p > 0.05$) (**table 3**).
- There was no statistically significant difference between food consumption speed and portion amount and plate size ($p > 0.05$, $p > 0.05$) (**table 4**).

- There was no statistically significant difference between regular sports and portion size and plate size ($p > 0.05$, $p > 0.05$) (**table 5**).

One of the increasing obesity prevention methods is the measure of the plates we use and the amount of food we consume. While individuals can easily find the amount of servings of menstrual, granular foods, they are struggling with amorphous foods. At this point, individuals can be informed about portion sizes of foods. It should be emphasized that dietary therapy is an individual application because body portion varies according to the physical activity, gender and age.

Individuals in the community should be encouraged to prefer smaller plates both at home and outside the home. In this regard, it may be suggested to use dietitians in the preparation and presentation of menus in the places where catering is made in order to make necessary arrangements regarding the portion amount and plate size.

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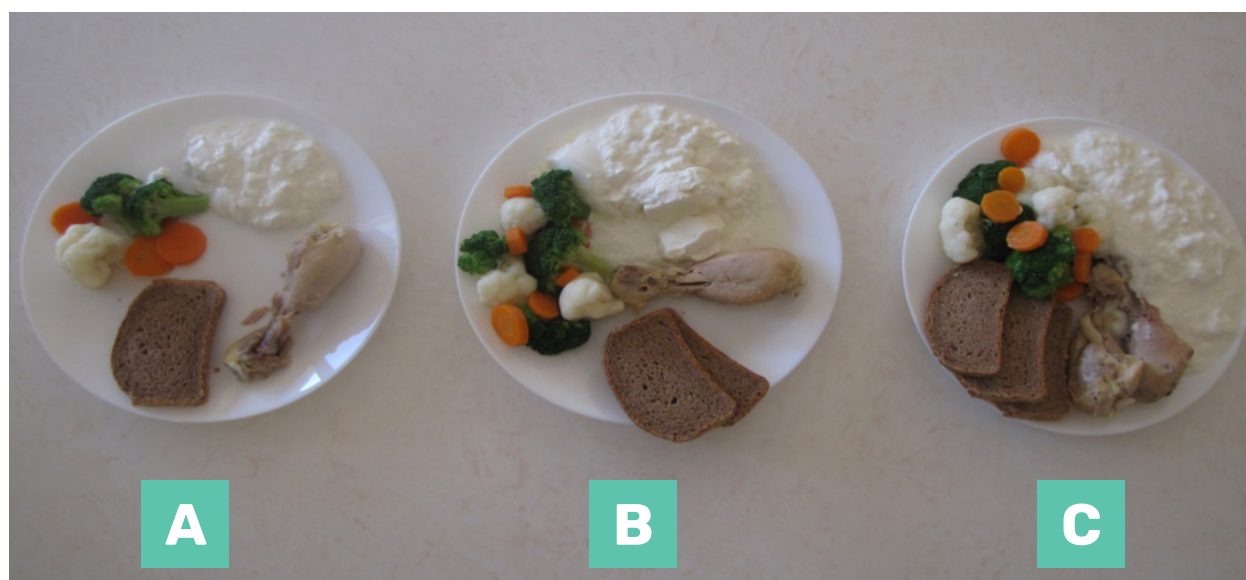


Fig. 1:

MENU CONTENT

Plates 25 cm in diameter

PLATE A (Half portion):

- 75 grams of boiled vegetables (30 calories)
- 1 slice (25 grams) of whole wheat bread (75 calories)
- 1 piece small size boiled chicken drumstick (150-200 calories)
- 120 ml homemade yogurt (75 calories)

PLATE B (One portion):

- 150 grams of boiled vegetables (45 calories)
- 2 slice (50 grams) of whole wheat bread (150 calories)
- 1 piece medium size boiled chicken drumstick (150-200 calories)
- 240 ml homemade yogurt (150 calories)

PLATE C (One and a half portion):

- 225 grams of boiled vegetables (60 calories)
- 3 slice (75 grams) of whole wheat bread (225 calories)
- 2 piece small size boiled chicken drumstick (300 calories)
- 360 ml homemade yogurt (225 calories)

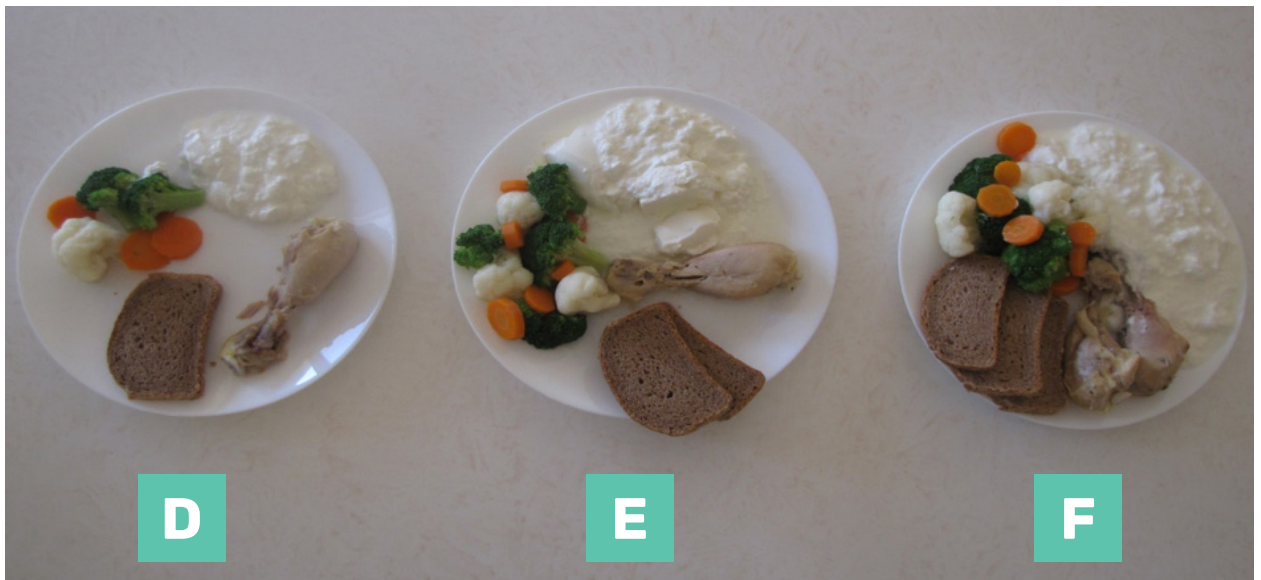


Fig. 2:

MENU CONTENT

The first plate is 25 cm (plate D), the second plate is 20 cm (plate E) and the third plate is 19 cm (plate F) diameter

PLATE (One portion):

- 150 grams of boiled vegetables (45 calories)
- 2 slices (50 grams) of whole wheat bread (150 calories)
- 1 piece medium size boiled chicken drumstick (150-200 calories)
- 240 ml homemade yogurt (150 calories)

Adverse and health improving effects of matcha green tea

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Abstract

Researches about the antioxidants have gained huge interest because of their critical biological functions in cancer and aging. Recent researches have proven that antioxidants in green tea may have protective effects against diseases, including cancer and dental cavities. Green tea and its by products are one of the well-known herbal teas consumed across the world. The health benefiting traits of the green tea is primarily based on a substance called catechin, although, the concentration of elements could also significantly influence its biological properties. One of the most salutary of these antioxidants is epigallocatechin gallate. In vitro and in vivo studies have been performed to discover potential therapeutic impacts of the epicatechin as a potential neuroceutical, have demonstrated ideal

biological effects such as neutralizing free radicals in the body, preventing oxidation, and improving the immune system. It is expected to reach higher EGCG concentrations on Matcha green tea than brewed loose leaf green tea since it contains its fibrous structure. However, many studies also mentioned the possible cytotoxic effects of catechins in high concentrations, especially on human hepatic cells cultures. Thus, this review summarizes most current studies made about antimicrobial, anti-inflammatory, antidiabetic and antitumoral effects of Matcha green tea and its possible cytotoxic impacts.

Keywords: Matcha green tea, EGCG, antioxidants, toxicity, antitumoral

Introduction

Matcha green tea is a speck of plant dust that came from China and spread to Japan from the South Song Dynasty (1127-1279 Ms) via priests. However, during the Ming dynasty (1368-1644 ad), the use of matcha green tea was reduced by the widespread use of black tea (Willems, M. E, et. al., 2018). However, after a long period of improvement and studies, powdered tea gradually became widely recognized in Japan and began to be utilized in many events such as Japanese tea ceremonies and various food processing

stages (Yamabe, N., et. al., 2009). Matcha green tea's production of in vitro reactive oxygen species has been confirmed to have a higher inhibition effect compared with the same amount of leaf tea (Willems, M. E et. al., 2018). In addition, it has been proven that it protects against liver and kidney damage by the repression of accumulation of advanced glycation and the repression of blood glucose, the accumulation and promotion of lipid metabolism and beneficial effects by antioxidant activities (Xu, P., et. al., 2016).

Matcha green tea is generally obtained by the collection of dark green tea leaves and a series of processing. Polyphenol oxidase activity is reduced in order to stop enzyme activity, steam and drying processes are subjected. Matcha green tea is a herbal tea which can be used as a dietary supplement and can have significant anticancer properties. However, the molecular pathways ancillary possible health enhancing benefits is mostly unknown. Hence, researches conducted these days are aiming to figure out the mechanism of Matcha green tea. Primarily, the prevalence of the researches particularly made about the effects of the antioxidant properties on cancer has shown a proportional increase. Epigallocatechingallat's (EGCG) activity on free radicals is the basis of these studies. The body contains a complex antioxidant defense grid based on endogenous enzymatic and non-enzymatic antioxidants. These molecules act collectively against vital biomolecules and free radicals to resist harmful effects on body tissues. Based on their responses to general free radical effects, they can be classified into first, second, third or even fourth defense antioxidants.

Free radicals are various by-products or intermediates produced by metabolism and oxidative stress in all oxygen-consuming cells (Reactive Oxygen Species, ROS). The oxygen we use to breathe is one of the main responsible factors for cell oxidation and serves to produce energy to the body, but it produces free radicals that normally occur in the body when a small part of this element is metabolized. ROS are essential intermediates in the human body, but they cause aging and the development of many diseases, including cancer, heart disease, degenerative diseases, Alzheimer's and Parkinson's. The most important demonstration of the

role of radical oxidation is given in Buenos Aires in the early 50s when Gerchman Rebecca and Daniel Gilbert found that the toxic effect of radiation increased greatly with the presence of oxygen. It is known that when ionizing radiation produces free radicals (the presence of a mismatched electron in the outermost orbit of a molecule or atom), oxidative reactions containing oxygen can initiate a chain. Since ROS is a powerful oxidizing agent or free radicals, they are dangerous to cellular structures and functional molecules (EG. DNA, proteins, lipids). Biological antioxidants show damping characteristics on ROS. However, they are not completely effective in eliminating all free radicals, oxygen ions, and peroxides that can damage the body. It can also be created from exposure to other external sources, such as ROS cigarette smoke, contaminants, chemicals, and environmental toxins.

ROS have been proven to be a great deal of risk, including cancer. Although there are natural antioxidants in our bodies that will extinguish ROS, we do not have the natural antioxidant production metabolism enough to extinguish ROS in excess of the excess amount released due to obesity or excessive calorie intake. Therefore, antioxidants that can be taken with nutrients gain great importance. In order to determine the antioxidant capacity of a substance, many electrochemical and spectrometer methods are used in the literature.

One of the most widely used standard measurement protocols is the ORAC (oxygen radical absorption capacity) test. Today, the capacity of many antioxidants is determined by the ORAC score. ORAC means oxygen radical absorption capacity. The ORAC test tests the ability of a plant or substance to absorb or eliminate free rad-

icals. These measurements are applied on 100 grams of plant/matter according to the standards set by NIA (National Institute of aging). ORAC tests are based on peroxy radical inhibition in oxidation initiated by thermal decomposition of AZO compounds such as [2,2'-azobis(2-amidinopropane) dihydrochloride (AAPH)]. In this way, ORAC tests use a biological radical source and combine both the duration of inhibition and the degree of inhibition to a certain amount. Recent changes in these tests include the use of fluorescein as the probe, adaptation to a highly efficient form and the ability of a substance to measure lipophilic, hydrophilic and total antioxidant capacity. ORAC measures the fluorescent signal from an extinguished probe in the presence of reactive oxygen species. The antioxidants absorb ROS in the environment where they are added and produce a fluorescent signal. In this way, the reaction of a substance to ROS is determined whether it is antioxidant and its ability to absorb free radical, i.e. elimination. The application of the ORAC test requires the separation of hydrophilic and lipophilic antioxidants in order to adapt the fluorescent probes and fluorescein (ORACFL) to a highly efficient platform and to measure total antioxidant capacity. The ORAC test is unique because the ROS generator AAPH (2,2'-azobis (2 methylpropanamidine dihydrochloride)) produces a peroxy free radical on thermal decomposition. This free radical is widely found in the body. In addition, AAPH is a reagent with water and lipid soluble substances, so it can measure total antioxidant capacity. In other words, the reason why AAPH is used as a primary indicator in the ROS category is that hydrophilic and hydrophobic substances are both reactive and free radicals in the human body. In this way, ORAC lipophilic and hydrophilic measures

total antioxidant capacity together. ROS affects the aging process as it damages bio-molecules. Biological antioxidants eliminate ROS, but they may not always be 100% successful. The industry name Trolox (6 hydroxy - 2,5,7,8 - tetramethylchroman-2-carboxylate) is an analog of Vitamin E and is a known antioxidant. It is used as a gold standard in the capacity measurement of the antioxidant plant/nutrient extracts to be tested.

The antioxidant activity of tea is mainly due to the phenolic substances it contains. Langley-Evans (2000), 35-45% of the antioxidants taken from the diet is due to tea flavonoids, the increase in the number of antioxidants passed during brewing as the temperature increases. Dillard and German (2000) reported that the daily intake of flavonoids was 25.9 mg per day, 61% of which was due to tea in 805 men between the ages of 65-84. Yen et al. (1997) reported that an average of 23 mg flavonoids was taken daily and 48% were obtained from tea. Vinson and Dabagh (1998), A.B.D daily per capita tea consumption of 1 g/day of tea (200-300 mg/day flavonoid if you have not received this amount of daily recommended vitamins C and E with β -carotene concentration (70 mg/day) is higher by declaring that emphasized the importance of tea as a source of antioxidants. The consumption of tea varies from country to country. Tea consumption in Northern Ireland is reported to be 3.16 kg (approximately 8.7 g/day) per person per year, 2.53 kg (approximately 7 g/day) in the UK, 2.25 kg (approximately 6.2 g/day) in Turkey (Trevisanato and Young-in Kim, 2000). In addition, green tea extracts with higher antioxidant properties than black tea have higher chain break activity and the ability to destroy active oxygen (Manzocco et al., 2005).

Tea with high antioxidant activity delays the oxidation of low-density cholesterol (LDL). Research has shown that the antioxidant potential in plasma increases significantly with tea consumption (Vinson and Dabagh, 1998; Langley-Evans, 2000b). Tea and tea catechins inhibit the onset, progression, and transformation stages of cancer with carcinogens and protect against coronary heart disease (Wang et al., 2004). It provides protection against the chemical carcinogens causing lung, esophagus, pancreas, liver, breast and colon cancer with tea consumption (Katiyar and Mukhtar, 1997). Green tea is widely consumed in China and Japan as a traditional non-alcoholic beverage (Yoshida et al., 1999). Green tea is a kind of tea produced without fermentation of fresh tea leaves, in other words, without allowing the enzymatic oxidation of catechins which form the main phenolic compounds of green tea. The first and most important step in green tea production is to stop enzyme activity in the leaf by heat application. The temperature and time applied for this purpose vary depending on factors such as leaf position, seasons and varieties. For example, since polyphenol oxidase (PPO) activity is greater in blind leaves than in mature leaves, heat treatment is applied to them at higher temperatures and longer periods (Zhen, 2002). Chinese hybrids with fewer catechins and caffeine and more amino acids are used in the production of green tea mostly compared to Assam hybrids (Gulati et al., 2003). Green tea is completely green unlike oolong and black tea because the color of green tea is not oxidized by catechins. It is thought that catechins, which are among the compounds of green tea with antioxidants and anticarcinogenic properties and which constitute 20% of green tea weight, are very important (Wang et al., 2000). It is stated that 68% of

the total antioxidant potential of green tea originates from catechins and 30% originate from EGCG alone (Stewart et al., 2005). Green tea production (Mizukami et al., 2006) a lot of research is being done on the health effects of green tea catechins, especially in recent years. Catechins are added to a variety of foods as antioxidant and antimicrobial additives due to their effects (Yilmaz, 2006). For example, the oxidative stability of these foods is increased with the use of catechins in fats and fatty foods as a result of the inhibition of lipid oxidation (Gramza and Korczak, 2005). Because fermentation causes a significant decrease in the amount of catechin, green tea contains more catechin than oolong and black teas (Cabrera et al., 2003). Green tea has the most EGCG from catechins. This is followed by EGC, ECG, EC, CG, GC, and C (Goto et al., 1996; Lin et al., 1996; Zuo et al., 2002; Nishitani and Sagesaka 2004; Perva-Uzunalić et al., 2006). In this ranking, EGC>EGC>EC>ECG>GC (Wang et al., 2000; Chang et al., 2000) and EGC>EGC>GC>ECG>C>EC (Wang et al., 2006). The amount of individual catechins in green tea varies according to the variety of raw material, especially variation, climate and growing conditions (Bonoli et al., 2003). For example, it is stated that the composition of the catechin is lower than that of the Japanese traditional matcha green tea, sencha tea, which is another Japanese tea, and that the catechin biosynthesis of the catechin is lower because of the growth of the tea leaves used in Matcha green tea production (Goto et al., 1996; Nishitani and Sagesaka, 2004).

Antimicrobial, Anti-inflammatory, Antidiabetic and Antitumoral Effects of Matcha Green Tea

The discovery of the epicatechin was first made by Ozawa, Hiroto, and Imagawa (1990) when diastereoisomeric procyanidins iso-

lated the essence of palm *Metroxylon Sagus* (Ozawa et al.) Previously synthesized by Foo & Porter (Foo & Porter, 1983) in 1983, Epicatechin is polyphenolic compounds with three hydrocarbon rings of six hydroxyl groups in different positions. Other steroids are epigallocatechin (eg), epicatechin-3-gallate (ECG) and epigallocatechin-3-gallate (EGCG) (Xu, Yeung, Chang, Huang, and Chen, 2004). Furthermore one of the researches has demonstrated that the rich extract of catechin leads to increased antioxidant activity and in vitro bioavailability. Since black tea is exposed to oxidative polymerization during fermentation, the epicatechin content shows downward orientation and therefore black tea has less epicatechin than *Camellia sinensis* green tea (Actis-Goretta et al., 2013). Moreover, since the production and utilization of green tea filters the main leafy parts of the plant, it has been shown that matcha green tea contains more phenolic groups. Matcha green tea includes EGCG (epigallocatechin gallate) in high concentrations which one of the strongest catechins in food and beverages. The high concentration of EGCG is one of the reasons why matcha is related to cancer prevention. Researches have demonstrated that EGCG can protect cells from DNA damage and inhibit tumour growth. The process of detoxification caused by Matcha green tea's antioxidants helps prevent heart disease, stroke, arthritis and other inflammatory conditions (Arranz et al., 2013). Green tea is a fermented product and protects 90% of flavonoids while fresh leaves are cooked in steam. Green tea obtained from *Camellia sinensis* plant consists of 30-40% catechins and 6% caffeine for 250-300 mg tea solid. A cup of green tea contains 100-150 mg of catechins, 8% of which are EC, 15% are EGC, 15% are EKG and 50% is EGCG (Barnett et al., 2015). Ep-

icatechin has various biological properties. Their biological properties are antioxidant, anti-microbial, anti-inflammatory, antithyroid and cardioprotective activities. The first biological feature demonstrated of the epicatechin was anti-diabetic activity in the early twentieth century. In the twentieth century, researchers focused on absorption capacity. However, several studies have also been conducted evaluating the anti-cancer activity of epicatechin in green tea. Currently, in addition to evaluating biological activities, many researchers focus on increasing bioavailability and productivity (Calabriso et al., 2016). Therefore, comparison of antioxidant and bio-availability capacities between matcha green tea and green tea is the focus of these studies. The main biological characteristics of the epicatechin are tested in various models such as in vitro (test tube-based and cell-based) and in vivo (animals and humans). In vitro studies on epicatechin mainly focused on the identification of biological activities such as antioxidant, anti-inflammatory, antimicrobial activity and vitro bioavailability used in vitro models containing cell cultures.

In addition, antioxidant capacity determination as in vitro and anti-inflammatory properties are also carried out. Chronic inflammation is known to be the result of ongoing oxidative stress, which may lead to activation of transcription factors. This results in the secretion of genes such as inflammatory cytokines responsible for growth factors and systemic inflammation and related reactions. Inflammation is a precursor reaction that slowly leads to angiogenesis for most tumor growths. However, collective data suggest that epicatechin and isomerizations of it can significantly reduce inflammation. In addition to that, for instance, Epicatechins found in the *Saraca*

indica plant showed antimicrobial activity against a variety of drug-resistant pathogens, including *S. aureus*. In addition, in cell studies, adequate data were obtained on anti-tumour or anti-proliferative activities of the epithelium using cancer cells lines, but it was concluded that more cell studies should be done and the effects of epicatechins on healthy cells and cancer cells should be observed for longer periods of time. Previously, cancer cell-based studies conducted, epicatechin has proven to be a potent inhibitor of primary and metastatic prostate cancer cell lines (di Leo et al., 2017).

In contrast, EGCG has been shown to have a more pronounced antiproliferative effect on these cell lines than the epicatechin, so EGCG is a potent inhibitor of cancer progression in most cancers such as glioblastoma, melanoma, and breast, colon, lung, prostate, pancreas, liver and oral cancers. It is known that recent clinical studies prove the anti-tumoural effect of epicatechin in patients receiving chemotherapy in Matcha green tea. In one study, found that oral consumption of epicatechin obtained from green tea extract and topical application inhibited skin tumour caused by UVB (ultra-violet B) or TPA (tetra-*racanoyl*phorol-13-acetate) in mice. Furthermore, epicatechin found in high concentrations in Matcha green tea has also shown cardioprotective, anti-diabetic, and neuroprotective activities. Several scientific types of research demonstrated the possible mechanism of cancer inhibition by induction of apoptosis, cell signalling or change in inflammation of EGCG. Most of these activities are linked to the antioxidant ability of EGCG found in Matcha green tea. However, there is no conversion of these mechanisms into in vivo in the animal or human model, and therefore further research is needed.

Possible cytotoxic impact of matcha green tea based on consumption dosages

Although Matcha green tea has several beneficial effects on health, the effects of Matcha green tea and its constituents may be beneficial up to a certain dose yet higher doses may cause some unknown adverse effects. Moreover, the effects of Matcha green tea catechins may not be similar in all individuals. EGCG of Matcha green tea extract is cytotoxic, and higher consumption of Matcha green tea can exert acute cytotoxicity in liver cells, a major metabolic organ in the body (Schmidt et al., 2005). Another study found that higher intake of Matcha green tea might cause oxidative DNA damage of hamster pancreas and liver (Takabayashi et al., 2004). Yun et al. (2006) clarified that EGCG acts as a pro-oxidant, rather than an antioxidant, in pancreatic cells in vivo. Therefore, a high intake of Matcha green tea may be detrimental for diabetic animals to control hyperglycemia. At a high dose (5% of the diet for 13 wk), Matcha green tea extract induced a thyroid enlargement (goiter) in normal rats (Sakamoto et al., 2001; Satoh et al., 2002). This high-level treatment modified the plasma concentrations of the thyroid hormones. However, drinking even a very high dietary amount of Matcha green tea would be unlikely to cause these adverse effects in humans.

Harmful effects of tea overconsumption (black or green) are due to three main factors: (McKay and Blumberg, 2002) its caffeine content, (Kavanagh et al., 2001) the presence of aluminium, and (Sueoka et al., 2001) the effects of tea polyphenols on iron bioavailability. Matcha green tea should not be taken by patients suffering from heart conditions or major cardiovascular problems. Pregnant and breastfeeding women

should drink no more than one or two cups per day because caffeine can cause an increase in heart rhythm. It is also important to control the concomitant consumption of Matcha green tea and some drugs, due to caffeine's diuretic effects (Bruneton, 2001). Some studies revealed the capacity of tea plants to accumulate high levels of aluminium. This aspect is important for patients with renal failure because aluminium can be

accumulated by the body, resulting in neurological diseases; it is, therefore, necessary to control the intake of food with high amounts of this metal (Costa et al., 2002). Likewise, Matcha green tea catechins may have an affinity for iron, and Matcha green tea infusions can cause a significant decrease in the iron bioavailability from the diet (Hamdaoui et al., 2003).

Conclusion

Laboratory researches proved the health improving effects of Matcha green tea. Even though there is a lack of clinical evidence based on human research, future investigation needs to define the actual magnitude of health benefits, establish the safe range of tea consumption associated with these benefits, and elucidate the mechanisms of action of matcha green tea. Advancement of more detailed and reliable methods with more representative models along with the development of good predictive biomarkers

will give a wider range to perceive of how Matcha green tea interacts with endogenous systems and other exogenous factors. Incontrovertible outcomes related to the shielding effects of Matcha green tea have to come from well-designed observational epidemiological studies and intervention trials. The determination of the biomarkers for Matcha green tea consumption, as well as molecular markers for its biological effects, will facilitate future research in this area.

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Families of patients in ICU: Their needs and satisfaction with care

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Abstract

Introduction: Admitting an adult to an intensive care unit (ICU) affects not only the patient, as well a son of the patient's family. Critical illness often occurs without warning, leaving families feeling helpless with no clear knowledge of what to expect from health care professionals or patient outcomes.

Aim: To identify the needs of families of adult intensive care unit (ICU) patients as perceived by family members and health-care providers.

Methodology: An extensive literature review of relevant articles for the period 2000-2019, was performed using Medline, PubMed, and Google databases, with the following keywords: family needs, intensive care units, critical care, family nursing.

Results: Review findings revealed that family members and health care providers ranked assurance, information, support, proximity and cultural and spiritual needs as the most important needs. Families believe not to receive their required attention

because the health care team incorrectly evaluates their needs. They are looking for collaboration, the inclusion of families in clinical discussions, and timely information regarding changes in the patient's condition. Information and generally communication including directions and expectations would have improved the families' experience. Psychosocial interventions like an information leaflet or the presence of a dedicated ICU support nurse can improve the number of family needs met, improving satisfaction and psychological well-being.

Conclusion: Family members of patients admitted to ICU have increased levels of needs in the assurance, proximity, and information dimensions that require to be addressed. This should guide the development of connection, effective communication, and beneficial cooperation toward offering the best possible care and support to ICU patients and their relatives.

Keywords: Family needs, intensive care units, critical care, family nursing

Introduction

Admitting an adult to an intensive care unit (ICU) affects an impact on the patient, as well a son of the patient's family. This process is often traumatic for the relatives and may result in a crisis within the family because they are not adequately mentally prepared for such a stressful situation **(1)**.

For the very first time, Nancy Molter in 1979 showed interest for the needs of family

members of the critical patient. She identified that an unresolved family crisis may affect the outcome for the critically ill patient **(2)**.

Family needs are defined as the requirements of family members, which, if fulfilled, relieve or diminish family distress and, if unmet, may produce distress in family members and the Intensive Care Unit (ICU) team **(3)**.

Feelings of shock, anger, guilt, fear of death or permanent disability, uncertainty about the patient's condition and prognosis, emotional conflicts, financial concerns, role changes, may also experience within the family **(4)**. Family members need support to effectively appraise, cope, and adapt to the stress of having a loved one in the critical care unit **(5,6)**.

Most ICU patients cannot make decisions on their own medical treatment and the family may be requested to make difficult treatment decisions on the patient's behalf. This situation multiplies the pressure on the family and increases their emotional needs **(7)**. From this review were identified four key research teams:

Family member's perception of their needs

According to Al Mutair et al, 2013 **(8)** the most important family needs identified were for information, followed by proximity, comfort and support, respectively. Families also want timely, clear and understandable information about their relative's medical condition

Another study show that family members feel the need to create an alliance with healthcare staff and that this had a positive impact on their ability to handle the situation they are being faced with **(9)**.

The most important need identified by the family members was the need for assurance, followed by information and proximity. A higher level of education was significantly associated with a higher level of need for assurance, information and proximity, according to Alsharari AF, 2019 **(10)** study.

In a study of Al-Hassan MA1, Hweidi IM., 2004 **(11)**, the top needs of the families were to receive information about the patients, to feel that the hospital personnel care about the patients and to have the information given in understandable terms.

Healthcare team's perceptions of family needs

Physicians and nurses were found to underestimate the relative's need for information, proximity to the patient and need for assurance. The patient's illness severity may also mean that the time available for communication with healthcare staff is limited and the ability to engage in discussion is compromised by the patient's clinical condition **(12)**.

Healthcare staff (medical and nursing) ranked the need for information and assurance as the top two important needs according to Takman C1, Severinsson E, 2006 **(13)** study.

ICU nurses and doctors do not perceive family needs accurately, undervalue their role and/or fail to sufficiently support the family **(14)**.

The presence of anxiety

According to Day et al., 2013 **(15)** risk factors associated with an increase in symptoms of anxiety included being female, a spouse, an unplanned ICU admission, lower educational status, poor sleep pattern, fatigue, lack of regular meetings with medical staff and failing to meet family needs.

Paul and Rattray, 2008 **(16)** highlighted that moderate to high levels of anxiety are present for up to 2 years after hospital discharge in relatives providing care after ICU.

A study of Pochard et al., 2005 **(17)** shows that symptoms of anxiety and depression were found in 73.4% and 35.3% of family members, respectively. 75.5% of family members and 82.7% of spouses had also symptoms of anxiety or depression.

Psychosocial interventions

Azoulay et al, 2002 **(18)** distributed a family information leaflet to supplement standardized family meetings to assess whether

it improved their understanding of diagnosis and proposed interventions. The leaflet improved comprehension of diagnosis and treatment but not of prognosis.

In Yousefi et al. 2012 study, (19) examined whether family satisfaction was improved by allocating families with a dedicated ICU support nurse. Information and explanations were given about the ICU environment, equipment and personnel as well as

treatment, diagnosis and prognosis. Satisfaction in the intervention group was significantly increased post intervention.

Lautrette et al. 2007 (20), introduced use of a bereavement brochure along with a proactive family conference for relatives of patients in ICU with high likelihood of mortality. They found significantly fewer symptoms of posttraumatic stress disorder (PTSD), anxiety and depression after 90 days.

Conclusion

Family members of patients admitted to ICU have increased levels of needs in the assurance, proximity, and information dimensions that require to be addressed. This should guide the development of connection, effective communication, and beneficial co-

operation toward offering the best possible care and support to ICU patients and their relatives. Meeting the needs of family members helps reduce anxiety, builds family confidence in the healthcare system, and ultimately improves patient outcomes.

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Organ transplantations in the elderly

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Abstract

Introduction: The process of aging is a biological and natural process where there is an increased risk of failure of most tissues, organs, and systems, leading to mechanical support of the elderly or organ transplantation.

Transplantation of human organs and tissues is one of the major achievements of the 20th century that has transformed the survival and quality of life of patients with end-organ dysfunction. It has been established as a routine therapeutic method allowing the recovery of body functions that had until then been partially replaced with mechanical support or lost to patients with organ failure.

Purpose: The purpose of this study is to investigate transplantations in the elderly and to identify their implications for everyday health practice.

Methodology: An extensive review of the relevant literature was performed via electronic databases (Google Scholar, Mednet, Pubmed, Medline, the Hellenic Academic Libraries Association -HEAL-Link) and scientific journals (English and Greek) using the following key-words: organ transplantations, organ donation, elderly and a combination of them.

Introduction

Transplantation of human organs and tissues is one of the major achievements of the 20th century that has transformed the survival and quality of life of patients with end-organ dysfunction.¹

Results: Transplantation is a strictly hierarchical medical procedure consisting of functional parts of the same importance and is applicable to all ages.

But in the elderly it is extremely difficult for someone to meet the "age criterion". When it is necessary to make a choice between young and old patients, in which of the two groups the graft needs to be given, the preference leans towards the young man.

In the context of the utilitarian ethics that pervades the vast majority of the modern Western medical systems, such an approach is completely acceptable, since older people do not benefit society as much as young people do. Such a utilitarian way of life is not always ethical as it ignores the specific nature of people.

Conclusions: Age should therefore not be the factor that determines people's right to live, but will act auxiliary and ethically in our forced choice among people who are all equally entitled to survive and live in general.

Keywords: organ transplantations, organ donation, elderly and a combination of them

It has been established as a routine therapeutic method allowing the recovery of body functions that had until then been partially replaced with mechanical support or lost to patients with organ failure.²

Nowadays, it is possible to transplant almost all solid organs of the human body and with proper medication (through immunosuppressive drugs), the risk of rejection is reduced and the vitality of the transplanted organ is prolonged. The evolution of Solid Organ Transplantation is marked by technical advancement, pharmacologic development, innovation in donor pool expansion, and standardization of transplantation-related practices.¹ As a result there is an increase in the demand for organs and tissues, which has always exceeded supply despite substantial expansion in deceased organ donation as well as greater reliance on donation from living persons in recent years.³ Transplantation is a strictly hierarchical medical procedure consisting of functional parts of the same importance and is applicable to all ages.

The **purpose** of this study is to investigate transplantations in the elderly and to identify their implications for everyday health practice.

The **study material** consisted of articles on the subject found in Greek and international databases such as: Google Scholar, Mednet, Pubmed, Medline and the Hellenic Academic Libraries Association (HEAL-Link), using the following keywords: organ transplantations, organ donation, elderly and a combination of them.

Division of transplantations

Transfer of organs, tissues and cells from a living or deceased donor to a chronically affected person in order to restore organ function is called transplantation.

The transplant division into classes is based on the relationship between the donor and the recipient. They are thus divided into:

- autografts, derived from tissues of the same human

- grafts removed from another human, which are divided into:
 - » isografts or related grafts where in the transportable tissue is genetically identical (e.g. twins), and
 - » allografts involving transfer of tissues in humans with different genetic composition (e.g. kidneys derived from a cadaveric donor)

The legislation containing the general rules and regulations governing the status of transplants in Greece and more broadly the EU makes no distinction between the above cases. The only modern distinction in law rules is based on a chronological criterion of the occurrence of death. Consequently, two major categories emerge: the transplantation from a living donor and a cadaveric donor.⁴

The legal framework defining the standards for organ transplantation is set out in Directive 2010/53/EU, also referred to as the European Organs Directive. The Directive sets the quality and safety standards for organs. It covers all steps in the transplant process from donation, through procurement, testing, handling to distribution.⁴

Organ transplants in the elderly

The process of aging is a biological and natural process of evolution that occurs with the passing of time in individual bodies after reproductive maturity. It's a universal, intrinsic, progressive and irreversible (deteriorous) situation. Adaptability, sensitivity (less sensitive), accuracy (less accurate), and strength (less well sustained) of the body progressively decrease. As a result, there is an increased risk of failure of most tissues, organs, and systems, leading to mechanical support of the elderly or organ transplantation.^{5,6}

The elderly find it extremely difficult to meet the "age criterion". When we are forced to choose between young and old patients, in which of the two groups the graft needs to be given, our preference leans towards the young man.^{7,8}

In the context of the utilitarian ethics that pervades the vast majority of the modern Western medical system, such an approach is completely acceptable, since older people do not benefit society as much as young people do.^{9,10} We also need to give young people the chance to grow old, so the dilemma of choosing a transplant will be in favour of the younger person against the elderly. This does not mean, however, that it is ethical for a person to be condemned to die, in this case an elderly person, because he is unable to play the role of other people's means of well-being, namely younger ones. Such a utilitarian way of life is unacceptable as it ignores the specific nature of people.^{11,12}

Conclusions

Thus, any donated organ ready for transplant should be carefully distributed to a receiver to ensure the best possible outcome.

This allocation should be based on the compatibility of the donated organ and receiver, the patient's waiting time on the waiting list, the medication requirement and

Age should therefore not be the factor that determines people's right to live, but will act auxiliary and ethically in our forced choice among people who are all equally entitled to survive and live in general.¹³

Since the right to life is recognized in all people, the age factor that differentiates people without discrimination, however, is indispensable in choosing the people to be saved, and necessarily involves a number of priorities in some patients over others.

Another serious problem also arises in organ recipients waiting lists, again based on age criterion. It is also evident here that younger patients are preferred.^{14,15} However, there are also cases where the age criterion can be omitted, such as when the prospective recipient is eponymous or too rich. Then unfortunately, the age criterion is forgotten and the law of the mighty applies.

other factors, including age, which should not be detrimental to the recipient.

Each country has its own organ allocation service, which usually operates on a national distribution basis and is accountable to its national health authorities.

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