T.C.
YEDİTEPE UNİVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

Assessment of the Nutritional Status of Individuals Aged 65 Years and above Attending to Istanbul University-Cerrahpasa Cerrahpasa Medical Faculty Hospital Geriatrics Outpatient Clinic

MASTER'S THESIS

Pelin CİN

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Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 15.../02./2019.... tarih ve .2019/03-02..... sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Sağlık Bilimleri Enstitüsü Müdürü

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

01.02.2019

Pelin CİN

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LIST OF SYMBOLS AND ABBREVIATIONS

BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
BMR	Basal Metabolic Rate
EFSA	European Food Safety Authority
ESPEN	European Society for Parenteral and Enteral Nutrition
FFM	Fat-Free Mass
GNRI	Geriatric Nutritional Risk Index
IU	International Unit
MNA	Mini Nutritional Assessment
MST	Malnutrition Screening Tool
MUAC	Mid-Upper Arm Circumference
MUST	Malnutrition Universal Screening Tool
NRS 2002	Nutritional Risk Screening 2002
PUFA	Polyunsaturated Fatty Acid
RDA	Recommended Dietary Allowances
SD	Standard Deviation
SGA	Subjective Global Assessment
SMMSE	Standardized Mini-Mental State Examination
WHO	World Health Organization

ABSTRACT

Cin, P. (2019). Assessment of the Nutritional Status of Individuals Aged 65 and above Attending to Istanbul University-Cerrahpasa Cerrahpasa Medical Faculty Hospital Geriatrics Outpatient Clinic. Yeditepe University, Institute of Health Sciences, Department of Nutrition and Dietetics, Master's Thesis. Istanbul.

Older adults are under risk of malnutrition since physiological, psychological, and social changes in the aging process affect food intake. This risk is associated with prolonged hospitalization period, decreased functional capacity, poor quality of life, and increased mortality. This study has been conducted on 215 elderly individuals who had standardized mini-mental state examination (SMMSE) score of 24 points and above (32.6% male, 67.4% female). The purpose of the study is to perform risk screening and assessment for nutritional status in elderly individuals and to determine the factors that affect this status. A survey form and 24-hour recall method was applied in order to determine general characteristics of individuals, their state of health, nutritional habits, frequency of food consumption and daily energy and nutrient intake. The MNA-long form was used for nutritional screening. Anthropometric measurements have been evaluated. Mean age has been determined as 76.1±7.0 years, mean BMI as 28.4±5.0 kg/m^2, and 24.7% of individuals had malnutrition risk while 3.3% had malnutrition. According to the nutritional state of individuals, a statistically significant difference was determined between age, marital status, appetite status, difficulty in chewing-swallowing, meal skipping, teeth loss, depression, anthropometric measurements, and daily energy and macronutrient intake ($p<0.05$). When we have performed regression analysis, malnutrition risk was associated with marital status, loss of teeth, appetite status, and depression diagnoses. Mean daily energy intake of all individuals was 1703.2±256.8 kcal. Of the total energy used 15.2% is supplied from proteins, 45.8% is from carbohydrates, and 38.7% is supplied from fats. Vitamin B1, vitamin B6, folate, potassium, calcium and magnesium intake of both genders were below required levels. The rate of malnutrition risk in elderly individuals is determined to be at similar rates with literature. In order to determine the individuals who need nutritional support and apply an effective nutritional intervention, routine nutritional screening and evaluation should be performed in the elderly.

Key words: Older adult, nutritional state, overweight, malnutrition, nutrient intake

ABSTRACT (Turkish)

Cin, P. (2019). İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 Yaş ve Üzeri Bireylerin Beslenme Durumunun Değerlendirilmesi. Yeditepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik Anabilim Dalı, Yüksek Lisans Tezi. İstanbul.

Yaşlanma sürecindeki fizyolojik, psikolojik ve sosyal değişimlerin besin alımını etkilemesinden dolayı yaşlı bireyler malnütrisyon açısından risk altındadır. Bu risk, hastanede kalış süresinin uzaması, fonksiyonel kapasitenin azalması, kötü yaşam kalitesi ve mortalitenin artması ile ilişkilendirilir. Çalışma, standardize mini mental test (SMMSE) skoru 24 puan ve üzeri olan 215 yaşlı birey (%32,6'sı erkek, %67,4'ü kadın) ile yürütülmüştür. Çalışmanın amacı, yaşlı bireylerde beslenme durumu risk taraması ve değerlendirmesi yapmak ve bu durumu etkileyen faktörleri ortaya koymaktır. Bireylerin genel özelliklerini, sağlık durumlarını, beslenme alışkanlıklarını, besin tüketim sıklıklarını ve günlük enerji ve besin ögesi alımlarını saptamak amacıyla anket formu ve 24 saatlik hatırlama yöntemi uygulanmıştır. Beslenme taramasında MNA-uzun form kullanılmıştır. Antropometrik ölçümleri değerlendirilmiştir. Bireylerin yaş ortalamaları 76,1±7,0 yıl, BKI ortalamaları 28,4±5,0 kg/m^2 olup, %24,7'si malnütrisyon riskine ve %3,3'ü de malnütrisyona sahiptir. Bireylerin nutrisyonel durumuna göre yaş, medeni durum, iştah durumu, çiğneme-yutma güçlüğü, öğün atlama, diş kaybı, ruhsal hastalık, antropometrik ölçümler, günlük enerji ve makro besin ögeleri arasında istatistiksel olarak anlamlı fark bulunmuştur ($p<0,05$). Regresyon analizi yapıldığında malnütrisyon riskini belirleyen faktörler arasında medeni durum, iştah durumu, diş kaybı ve depresyon yer almaktadır. Tüm bireylerin ortalama günlük enerji alımları 1703,2±256,8 kkal'dir. Kullanılan toplam enerjinin %15,2'si proteinden, %45,8'i karbonhidratlardan, %38,7'si yağlardan sağlanmaktadır. Her iki cinsiyetin de referans değerlere göre B1vitamini, B6 vitamini, folat, potasyum, kalsiyum ve magnezyum alımları gereksinmenin altındadır. Yaşlılarda malnütrisyon riski oranı literatüre benzer orandadır. Beslenme desteğine ihtiyaç duyanları belirlemek ve etkili beslenme müdahalesi uygulamak için yaşlılarda beslenme taraması değerlendirilmesi rutin olarak yapılmalıdır.

Anahtar Kelimeler: Yaşlı birey, beslenme durumu**,** şişmanlık, malnütrisyon, besin ögesi alımı

1. INTRODUCTION AND AIM

Projections based on the assumption that the demographic trend will continue today indicate that the 21st century will be the old century in Turkey in parallel with the expectations of all over the world. According to the United Nations report, the number of individuals 60 years and older in the world population is 962 million in 2017 and is expected to reach 2.1 billion in 2050 (1).

Aging is a biological process that affects many of cells, systems, organisms, and species. In this process, various physiological, psychological, economic and social changes that can adversely affect the nutritional status, as well as the disease and weakness, are accompanied. For this reason, elderly people become predisposed to malnutrition and may have nutritional problems (2). Malnutrition, overweight, obesity, micronutrient abnormalities and re-feeding syndrome are the main nutritional disorders. Sarcopenia and frailty are conditions related to nutrition based on complex and multiple reasons (3).

Malnutrition is a condition in which deficiency or imbalance of energy, protein, and other nutrients causes adverse effects on body form, function and clinical outcomes (4). Multicenter studies assessing the prevalence of malnutrition in hospital setting report that 23-60% of elderly patients are malnutrition and an estimated 22-28% are at nutritional risk (5). In older adults, unintentional weight loss of over 5% in the last 1 month or over 10% in the last 6 months is associated with morbidity, mortality and postoperative complications. In addition, information such as chewing difficulty, dysphagia, decreased appetite, physical condition, life status, social problems, alcohol intake, and drug intake can determine the risk of malnutrition (6). The risk of malnutrition and malnutrition is associated with prolonged hospital stay, increased fall risk, reduced functional capacity, poor quality of life and increased mortality. In order to minimize this situation, it is emphasized that nutrition screening is necessary to determine the older adults who will need nutritional support (7).

Obesity in older adults is associated with new or worsening disability and weight loss treatment can improve physical function and quality of life. According to a study conducted in older adults, the main concern is malnutrition rather than being overweight,

because the relationship between morbidity and mortality is much stronger than that of obesity (8).

Observing nutritional intake, physical strength, functional status and physiological changes over time give important clues to potential nutritional problems in the elderly. Screening of nutritional status is the first step in this process, as early detection of nutritional risks is possible (9). The guidelines for nutrition screening published by the European Society for Parenteral and Enteral Nutrition (ESPEN) in 2015 indicate that the Mini Nutritional Assessment (MNA) test is the most frequently used and recommended screening test in the elderly (10). While evaluating the nutritional status of elderly individuals, all information including the intake amounts of nutrients and nutrients, psychological and social factors, physical conditions and diseases, anthropometric measurements, laboratory values, and medications are evaluated by taking into consideration many risk factors (11). The nutritional intake assessment component of the nutritional status assessment is necessary for the planning of individual nutritional interventions and it is also beneficial to develop public health and nutrition policies (12). Changes in body composition and nutrition that occur during the aging process differ in men and women in different life stages and are reflected in anthropometric measurements. Therefore, anthropometric measurements are an important part of nutritional assessment in geriatrics, because it allows the determination of malnutrition, overweight and obesity, loss of muscle mass, fat mass gain and loss, the distribution of adipose tissue (13).

This study aims to perform a screening of malnutrition risk by using MNA-long form screening tool in patients aged 65 years and above attending geriatrics outpatient clinic of Istanbul University-Cerrahpasa, Cerrahpasa Faculty of Medicine Hospital. In addition, after screening of nutritional status of the elderly, this study aims to evaluate the nutritional status by questioning many factors including intake amounts of food and nutrient, nutritional habits, oral and dental health, disease and drug status, anthropometric measurements, psychological and social factors, physical function and capacity and to relate these factors to the nutritional status.

2. LITERATURE REVIEW

2.1. Physiology of Aging

Aging is naturally a physiological process that occurs before death. The length of the process predominantly determines the life of the individual (14). Molecular and cellular damage caused by aging cause a gradual decrease in physiological reserves, an increased risk of developing many diseases and a general decrease in the individual's capacity (15). The gradual progression of aging leads to longevity, whereas early occurring and haste evolving or death in some special tissues may lead to shorter lifespan resulting in early deaths (14).

As genetics, lifestyle and disease processes affect the aging process of humans, aging is a heterogeneous process. For this reason, there is no single way to define aging and can be defined as chronological, biological, psychological and social (16). An important distinction is a chronological and biological age. Chronological age is determined by the passage of time since birth or from the actual age of an individual. Quantitatively measured by quantity or years (17). The World Health Organization (WHO) evaluates individuals aged 65 and older as elderly individuals or geriatric populations (15). On the other hand, biological age is determined by the physiological state of an animal or tissue. It can be measured by the maturation rate of the biological system. Biomarkers such as telomere length shortening, cell cycle, DNA damage, and apoptosis can increase biological aging (17). Chronological and biological age, mostly do not match. For example, some 70-year-olds perform their physical and mental functions well, while others may be weak or need significant support to meet their basic needs. The reason for this is that many of the mechanisms of aging are heterogeneous. At the same time, however, these changes are strongly influenced by the environment and lifestyle of the individual (15).

Because biological systems are complex, one theory is not sufficient to explain the mechanisms of aging. It is known that the genetic structure affects 1/3 of life and is influenced by environmental factors. Nutrition genomics is an area that examines the interaction between genetics and nutrition. In order to increase gene-controlled responses to inflammation, it may help to promote healthy aging by regulating interventions such as adding omega-3 fatty acid to the individual's diet according to specific risk factors (16).

Several theories have been proposed to explain the effects of aging. Fundamental theories of aging include general genetic theory, cellular aging/telomere theory, neuroendocrine theory, immunological theory, free radical theory (18). Genetic theory suggests that aging is a direct result of a genetic program and that the life of each animal species is regulated by genetic factors (19). Although many genes display changes in expression along with aging, some are believed to exist to support longevity (17).

Endocrine hormones are involved in growth, metabolism, body temperature, inflammation and stress control. The endocrine theory also assumes that the deterioration of the hypothalamus-pituitary gland-endocrine systems, which have a wide range of effects on many physiological functions of the body and regulate body homeostasis, is the main cause of aging (20).

Telomeres are gene sequences located at the ends of chromosomes responsible for maintaining genome integrity. The telomer theory suggests that normal somatic cells have a finite maximum life and lose telomere DNA by each cell division as a function of aging as in vitro studies. The length of telomeres is higher at birth and gradually decreases with age, so shortening is considered a biomarker of chronological age advances (21).

The immunological theory of aging reveals that physiological aging is associated with an irregularity of the immune system. Reduction of the immune system occurs as a result of aging, leading to increased susceptibility to infections, reduced efficacy of vaccination, and a higher incidence of many diseases, including osteoporosis and cancer in older adults (22).

The theory of free radical aging widely supports the accumulation of reactive oxygen species throughout the life of mitochondria, leading to chronic oxidative stress in the elderly. Since antioxidant defense mechanisms and DNA repair capacity are impaired in the elderly, DNA damage has been suggested as a result of aging. Impaired DNA stability increases the frequency of cytogenetic aberrations, which is highly correlated with age-related diseases such as cancer, diabetes, cardiovascular diseases and cognitive decline (23). Organisms have various defense systems to protect themselves from the toxicity of free radicals. The primary defense system for the prevention of damage includes antioxidant compounds such as vitamin E, β-carotene, ascorbic acid, and uric acid, as well as antioxidant enzymes including superoxide dismutase, glutathione peroxidase, glutathione reductase and catalase (20).

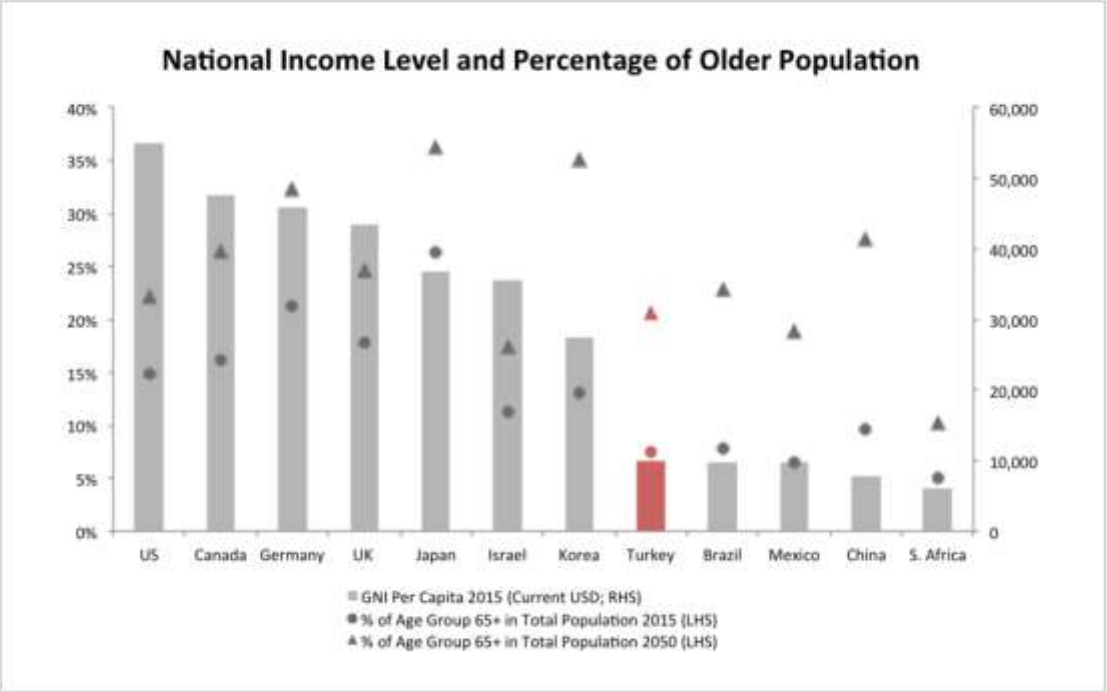
2.1.1. Elderly Population and Life Expectancy in the World and Turkey

The percentage of elderly people in the world is growing rapidly. According to the WHO, two important reasons for the increase of the elderly population are; increase in life expectancy at birth and decrease fertility rate. As countries evolve, it is seen that they have better public health, more people are saved from childhood death and most of the deaths occur in people older than 70 years. According to the WHO, by the year 2050, the population aged 60 and over is expected to reach 2 billion in 2015 from 900 million (15). In 2002, approximately 400 million of the 605 million elderly in the world lived in low-income countries. In 2050, it is expected that the population of 65 years and over in the world will reach 1.5 billion, the highest increase is in developing countries and 314 million people in the world will exceed 80 years and over, 61 million 90 and over, and 3.2 million people will exceed 100 years of age (24).

According to the 2017 report of the United Nations, in the world's population the number of individuals aged 60 and above is over 962 million in 2017 and is expected to approach 2.1 billion in 2050. Globally, the number of people aged 80 and older is growing rapidly. Projections show that the number of people aged 80 and over worldwide will increase more than threefold between 2017 and 2050 and will increase from 137 million to 425 million. According to the same report, two-thirds of the elderly in the world live in developing regions and are growing faster than those living in developed regions (1).

In 2017, 8.9% of the world population was composed of the elderly population. The first three countries with the highest proportion of elderly population were Monaco with 32.2%, Japan with 27.9% and Germany with 22.1%. Turkey was ranked 66 among 167 countries in this ranking (25). According to The Aging Readiness & Competitiveness Report Turkey in 2017, among the countries with the Organization for Economic Cooperation and Development member, Turkey has begun to rapidly aging population. In 2050, aged 65 and over in Turkey will exceed 20% of the total population is provided (Figure 2.1) (26). According to the 2050 age projections reported by the Turkish Geriatrics Society, the number of individuals aged 60 and over is approximately 24 thousand (26% of population), while the number of individuals aged 80 and over is estimated to be 4 thousand (4.3% of population) (27).

Figure 2.1. National income level and percentage of elderly population (26).

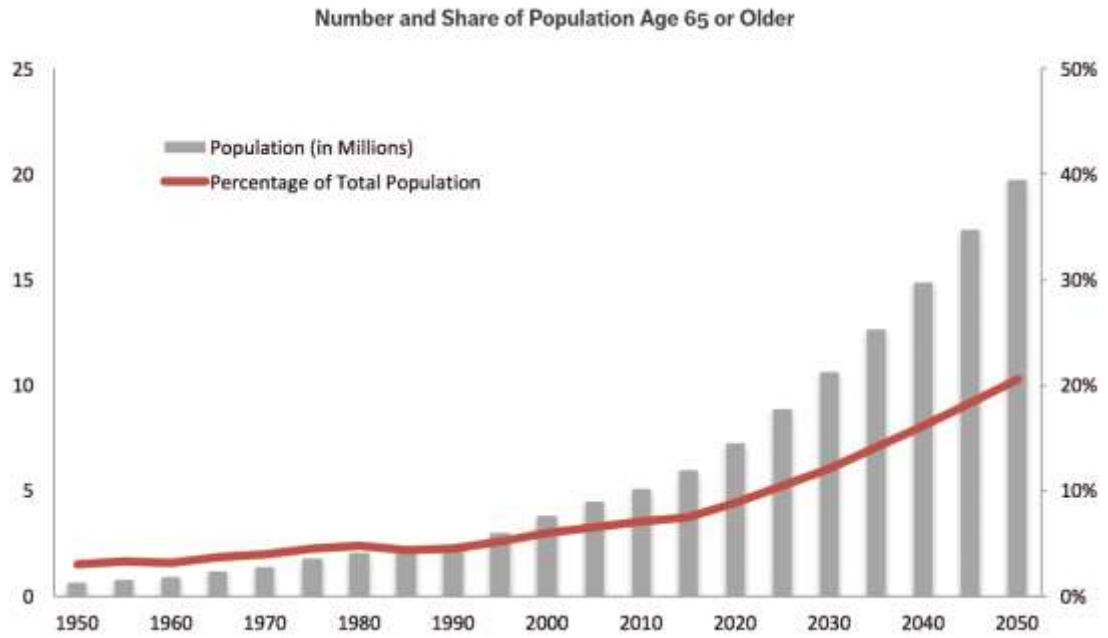


In Turkey, the elderly population (65 years and above) in 2013, while 5 million 891 thousand 694 people, was 6 million 895 thousand 385 people in 2017 increased by 17% over the last five years. While the ratio of the elderly population in the total population was 7.7% in 2013, it increased to 8.5% in 2017. According to population projections, the proportion of elderly population is estimated to be 10.2% in 2023, 12.9% in 2030, 16.3% in 2040, 22.6% in 2060 and 25.6% in 2080 (25). According to The Aging Readiness & Competitiveness Report Turkey in 2017, according to years, the number of individuals age 65 and older and the percentage in the general population in Turkey is shown (Figure 2.2) (26).

These changes in age distribution in the world and the resulting demographic change can be attributed to a significantly reduced birth rate, greater economic development, more effective medical interventions (therefore a reduction in mortality), and hygiene, nutrition, lifestyle and overall improvements (28). Due to the increase in the health sector and the decrease in the birth rate, the population of the industrialized countries is getting older and the life expectancy at birth is prolonged (2). Life tables,

according to the results of 2014-2016, the period life expectancy at birth in Turkey to the overall total of 78, men at 75.3 and women 80.7 years (29).

Figure 2.2. According to the years, in the number and percentage of population age 65 and older adults in Turkey (26).



2.1.2. Age-Related Physiological and Metabolic Changes

In the normal aging process, depending on time, some changes occur in the body structure, the functioning of the organs, and organs (30). Physiological changes with age may vary according to individuals. Some of the common changes seen in humans are: the function of the immune system is reduced by 30 years, which reduces defense against infection or tumor formation and increases the likelihood of autoimmune disorders, metabolism begins to slow down around the age of 25, kidney and liver function decline, blood vessels lose elasticity, peaks of bone mass fall about 1% per year after 30 years of age; the senses disappear, the epidermis becomes dry and the dermis thins; sleep quality and need are reduced, and when the brain loses 20% of its weight, it slows the recovery

and mental performance. A number of age-related diseases may develop due to tissue, organ and system failure (31).

2.1.2.1. Physical Changes

Aging causes various changes that have important consequences on body composition, health and physical functions (30). Research has shown that body weight and Body Mass Index (BMI) increases with age up to about 50 to 60 years of age and both gradually decrease at later ages (4). At the same time, there is a progressive decrease in lean body mass and an increase in body fat. The decrease in physical activity, decreased growth hormone secretion, decreased sex hormones and decrease in Basal Metabolic Rate (BMR) and thermal effect of nutrient are related with increasing fat mass (32). Daily energy expenditure is associated with BMR, diet-induced thermogenesis and activity. All components may vary with age. Since metabolic velocity is a function of largely fat-free mass, BMR decreases slightly as the lean mass decreases, depending on the body weight. Studies show a 10-20% reduction in BMR between 30 and 75 years (33).

With age, bone tissue and total calcium levels decrease. Bone and total calcium levels of women in each age group are lower than men. Total body water is accompanied by a loss of lean body mass by decreasing age. Body water is reduced by 17% from 30 to 80 in women, and by 11% in men in the same period. This reduction mainly reflects the decrease in the amount of intracellular water (30).

2.1.2.2. Changes in Body Systems

The effects of aging on the senses of smell and taste can affect the food intake. On the tongue, there is a loss in the number of taste buds per papilla. Generally, up to 50% of elderly individuals can cause loss of taste and odor loss (30). Age-related tooth loss, weakening of the chewing muscles, decreased salivation, and difficulty in swallowing may also affect food intake (16).

Hormones play an important role in regulating nutrient uptake and use. Nutritional status also significantly affects circulating hormone levels (11). As a result of aging, the amount of most of the hormones secreted by the peripheral endocrine cells and organs as

well as the hypothalamus, the pituitary gland, varies considerably. For example, the secretion of melatonin, growth hormone, sex hormones, dehydroepiandrosterone, and many other hormones decreases, while the secretion of thyroid stimulating hormone (TSH) and cortisol can be increased without disease (34). Along with aging, calcium and protein levels in the bones are reduced and bone mineral density decreases, collagen fibers decrease. As a result of these changes, the strength and flexibility of the bones are reduced and the risk of fracture increases. Parathyroid hyperactivity, muscle weakness, and exercise deficiency are among the factors that cause the reduction of bone mass (20).

As a result of changes in the gastrointestinal tract with age, esophageal sphincter pressure decreases, gastric pH increases, gastric emptying is delayed, and intestinal muscle tone decreases. As a result, absorption and digestion decreases and drug solubility also vary. Atrophic gastritis is common in the elderly and the decrease in acid secretion is associated with macrocytic anemia, leading to a decrease in intrinsic factor and vitamin B12 levels (35, 36). Total liver mass and weight, hepatocyte count, regenerative capacity, hepatic blood flow, and enzyme levels are decreased. This results in a decrease in drug clearance (35). The clinical effects of these physiological changes include a decrease in appetite, a disturbance of the passage of food into the intestine, a decrease in absorption of calcium and iron, a change in drug efficacy, and an increased risk of constipation, esophageal spasm and diverticular disease (37).

Changes in the immune system occur in old age. Conditions such as deterioration or regression of T-cell functions, decrease in primary and secondary antibody response due to T-cells are common. This decline in immune-susceptibility level is associated with increased susceptibility to a number of diseases, such as cardiovascular diseases, autoimmune diseases, malignancies, allergies, vaccination and impaired responses to infection (38).

With increasing age, the total number of nerve cells and the total weight of the brain and spinal cord decreases and a decrease of about 20% in the cerebral blood flow occurs (20). Neurological changes may cause a decrease in nutrient intake and may adversely affect gastrointestinal functions (11).

In the kidney, important anatomic and physiological changes caused by aging occur. Along with aging, the size, weight, and volume of the cortex in the kidney and the number of renal glomeruli decrease. In addition, since congestive degeneration and

hardening of the glomeruli occurs, the function of glomerular filtration rate and renal tubules decreases (39). This reduction in the glomerular filtration rate is associated with a reduction in the number of nephrons. These changes due to the aging of the kidneys, which play a significant role in systemic hemodynamics, weaken the adaptation ability of the kidney, especially the deterioration of fluid balance and the development of acute kidney damage, many kidney diseases are observed more easily and frequently in elderly patients (40). Age-related changes in the bladder cause dysuria, pollakiuria and urinary incontinence (20).

Age-related changes in the cardiovascular system are seen especially in the arteries. Arterial walls are thickened, hardened and endothelial dysfunction is seen that causes vasoconstriction. Because of these anatomical changes, the heart shows a functionally reduced diastolic alignment as well as an increased pulse pressure. Maximum heart rate, maximum stroke volume and circulating blood volume are reduced. Hypertension, heart failure, coronary artery disease, atrial fibrillation is more common. (41).

There is a decrease in lung function due to the elasticity of the lung tissue decreasing in age, decreasing diffusion capacity damage to the alveoli, increased thickness of the alveolar walls and small airway obstruction (42). Physiological changes occur in the skin with aging. The decrease in the subcutaneous fat tissue, collagen fibrils expansion reduces skin elasticity, the elasticity of the skin disappears and delay in wound healing may occur (43).

2.2. Impact of Nutrition on Healthy Aging

Healthy aging is defined by WHO as a process in which healthy aging develops and maintains functional skills that will help to be healthy in older ages. In research protocols and policy documents, expressions such as "healthy aging", "successful aging" and "active aging" are important and increasingly widespread (15). The components of healthy aging include low cognitive and disease-related disability, high cognitive and physical functional capacity, and active association with life (44).

Turkey Healthy Aging Action Plan and Implementation Program 2015-2020, objectives and strategies for ensuring access to food and adequate nutrition for all older people are determined. Targets include;

- To gain healthy eating habits in all age groups until the aging process,
- Prevention of malnutrition in the elderly and effective treatment for malnutrition,
- For individuals over 65 years to develop specific nutrition policy,
- Ensure adequate and balanced nutrition in older adults,
- Establishment of clinical nutrition teams in hospitals,
- Training of all health and care personnel on the principles and support of healthy nutrition,
- Providing solutions to the problems of reimbursement and application of nutritional products in patients with nutritional problems (45).

A healthy aging process not only increases the years of life, but also reduces the likelihood of disease and disability associated with the disease, leading to high levels of cognitive and physical capacity and healthy active years (44). It is clear that diet and lifestyle change contribute significantly to the development of age-related diseases, and that the modification of the diet may contribute to the prevention of patients and therefore will help to improve the quality of life in the old age (31).

Imbalance in the intake of nutrients based on evidence and effective in many disease development is an issue to be considered in terms of public health. These imbalances; energy, total fat, saturated and trans fatty acids, sugar and salt can be caused by over-consumption. In addition, unsaturated fatty acids, dietary fiber, water, some vitamins and minerals (such as vitamin D, folate, potassium, calcium, iron, iodine) may also occur with inadequate intake (12). For example; levels of macronutrient uptake may play an important role in the progression of age-related diseases and may affect the quality of life. The total amount of polyunsaturated fatty acids and saturated fatty acids in the Western diet and their ratio to each other may affect the incidence of atherosclerosis and cardiovascular diseases (31).

Most individuals are faced with the potential consequences of the aging process, which is defined as a gradual, lifetime accumulation of molecular and cellular damage, resulting in a gradual loss of function, frailty, and disease over time. The development of a chronic, low-grade, inflammatory condition is a common feature of the aging process and causes many age-related disorders. Whole-grain foods, fruits and vegetables,

legumes, oilseeds, fish and low-fat dairy products are among the components of a healthy nutrition model, and the consumption of these foods is associated with low inflammation. Since aging is also associated with an increase in the concentration of inflammatory markers in the bloodstream, polyphenolic compounds, antioxidants, prebiotics, probiotics and omega-3 fatty acids in the nutrients content have an important role to reduce inflammation (46). Although some age-related conditions such as sarcopenia and dementia are irreversible, other factors such as healthy nutrition information, physical and social environment can be changed. Targeting these modifiable factors may slow or even reverse the health decline (47).

2.3. Nutrition Related Disorders in Older Adults

Elderly individuals experience various nutritional problems associated with other age-related changes, including total body protein reduction, total body water reduction, a loss in bone density and an increase in the proportion of total body fat (37). Malnutrition/undernutrition, overweight, obesity, micronutrient abnormalities, and re-feeding syndrome are the main nutritional disorders. Sarcopenia and weakness are conditions related to complex and multiple causes of nutrition (3).

Along with aging, the development of chronic diseases such as diabetes, cancer, and heart disease, and the increased risk of fragility, cognitive decline, and disability (48). According to the causes of death statistics in Turkey, 45.6% of the elderly who died in 2016, the circulatory system to have died due to disease, this disease is second in benign and malignant tumors by 16.3%, while third respiration with 13.9% system diseases has been reported (25). Adequate and balanced nutrition is known to bring tangible benefits to older people and many diseases and conditions related to age can be prevented, modulated or improved with nutrition (48).

Functional disorders of the digestive system cause a number of symptoms and diseases such as dysphagia, gastroesophageal reflux disease, primary dyspepsia, irritable bowel syndrome and chronic primary constipation (36). Among the most common micronutrient deficiencies in the elderly are vitamin D and B12, with a lower rate of vitamin A, calcium, folate, iron, zinc, magnesium and copper (49).

Disruption of the balance in the elderly usually manifests as injuries associated with falls and falls. Falls are one of the most common causes of death and death related deaths in people aged 75 years and over. Approximately one-third of the elderly living in the community fall at least once a year and many people fall more than once (50). Strength, balance and flexibility exercises are the most effective strategies to prevent falls among older adults. Other positive effects of physical activity are longer independence in self-care activities, higher self-esteem, better quality of life, higher life expectancy, and reduced mortality (51).

Nutrition is an important health and wellness modulator in elderly people. Malnutrition contributes to the progression of many diseases and is also considered to be an important factor in the complex etiology of sarcopenia and frailty (52, 53). According to the 2010 report of the European Association of Geriatrics; Sarcopenia is defined as a syndrome characterized by generalized and progressive muscle mass and loss of strength, which can lead to poor outcomes such as physical disability, low quality of life and death. This definition is not only the loss of muscle mass but also the function, power and performance loss (53). Numerous epidemiological studies using different measurement methods and breakpoints have tried to establish the prevalence of sarcopenia. In general, it is seen that 5-13% of people aged 60-70 years and 11-50% of people aged 80 years are sarcopenia (54). Decreasing hormones along with aging (growth hormone, insulin-like growth factor-1, corticosteroids, androgens, estrogens), increased proinflammatory cytokines associated with chronic inflammation (Tumor necrosis factor-α, interleukin-1β, interleukin-6) may be involved in the development of sarcopenia (55). The prevalence of frailty, a common geriatric syndrome in the elderly, increases with the aging of the population. Frailty is often defined as greater vulnerability to age due to low physiological reserves. It is associated with lower quality of life and lower quality of life, including falls, fractures, hospitalization, dementia and premature death in the elderly (56). Frailty is associated with an increased risk of adverse health outcomes and is estimated to affect approximately 7-25% of individuals aged 70 and over (52).

Cachexia is a complex metabolic syndrome characterized by loss of muscle mass, with or without loss of fat mass. It is mediated by pro-inflammatory cytokines and is associated with a number of chronic conditions such as cancer, HIV/AIDS, heart failure, and chronic obstructive pulmonary disease (5).

2.3.1. Malnutrition/Undernutrition in Older Adults

Malnutrition is a condition in which deficiency or excess of energy, protein, and other nutrients causes adverse effects on body form, function and clinical outcomes. Malnutrition may be caused by starvation, disease or advanced aging (>80 years), alone or in combination (3). Malnutrition tends to develop more frequently in the elderly, and can significantly affect the quality of life, physical and psychological functions, as well as metabolic and inflammatory conditions (57). In the elderly, unintentional weight loss of >5% in the past 1 month or >10% within the previous 6 months or markedly decreased body mass (BMI <20 kg/m^2) or loss of muscle mass are seen as serious symptoms of malnutrition. The underlying causes need to be clarified. These symptoms are associated with morbidity, mortality and postoperative complications (6). The last global consensus approach for the diagnosis of malnutrition advocates a combination of at least one phenotype criterion (unintentional weight loss, low BMI or decreased muscle mass) and an etiology criterion (reduction of food intake/severe illness with malabsorption or inflammation) (58). If the oral intake of nutrients is significantly reduced in the elderly (less than 50% for more than three days) or there are risk factors that may reduce nutrient uptake or increase the requirements (e.g. acute disease, neuropsychological problems, immobility, chewing problems, swallowing problems), they are at risk of malnutrition. (59).

2.3.1.1. Prevalence of Malnutrition in Older Adults

Multicenter studies assessing the prevalence of malnutrition report that 23% - 60% of elderly patients are undernourished in hospital settings and that there is an estimated 22% - 28% nutrition risk (5). 28% of patients who applied to Geriatric Polyclinic in Hacettepe University were found to have poor nutritional status (60). In the study conducted at Istanbul University, the risk of malnutrition was 31%, malnutrition rate was 13%, malnutrition risk was 39% and malnutrition rate was 25% in the patients admitted to the polyclinic (61). In a study conducted by Bahat et al., the nutritional status of elderly women living in Turkish society (n=438) was examined and malnutrition was found in 5% of the individuals and malnutrition risk was found in 24.7% of the individuals (62). In a study conducted in Turkey with individuals 65 years and older (n=1030), risk factors

associated with nutritional status were investigated. As a result of the study, 29.1% of the subjects had malnutrition risk and 19% had malnutrition risk (63).

According to a study combining data from 12 countries to determine the frequency of malnutrition using MNA, the prevalence of malnutrition was found to be 22.8% among 4507 people, with significant differences between these rates. The prevalence of malnutrition was 50.5% in the rehabilitation centers, 38.7% in the hospital, 13.8% in the nursing home and 5.8% in the community. In the unified database, the proportion of the group that is "at risk" in terms of nutrition is 46.2%. As a result, approximately two-thirds of the participants in the study had a nutritional risk or malnutrition (59). In a study conducted by Lara-Pulido et al., the frequency of malnutrition of 769 elderly patients was investigated and reported 22.5% of the patients were at risk for malnutrition and 7% malnutrition during admission (47). In a study by Bollwein et al., the relationship between MNA results and the frailty status in 206 elderly patients was investigated and it was found that 15.1% of the patients had a nutritional risk. Of the patients at risk of nutrition, 15.5% were frail, 39.8% were susceptible to frail (prefrail) and 44.7% were not frail. At the end of the study, it was found that 90% the risk of malnourished patients were prefrail or frail (64).

2.3.1.2. Causes and Results of Malnutrition in Older Adults

Adequate and balanced nutrition is the basis for a healthy life. There are various physiological and nonphysiological mechanisms in the regulation of food intake of elderly individuals. Physiological reasons include taste and odor change, delayed gastric emptying, changes in digestion-associated hormone secretion and response. Non-physiological causes include social (poverty, loneliness, etc.), psychological (depression, dementia, etc.), medical (acute and chronic diseases, etc.) and pharmacological factors. Elderly individuals are susceptible to malnutrition depending on all these factors (65). Many social, physiological and psychological factors affecting the nutrition processes and ultimately energy intake of elderly individuals are shown in Figure 2.3 (66).

Aging anorexia, defined as a decrease in appetite loss and/or food intake at a late age, is the main cause of malnutrition and is mediated by various factors. The term anorexia of aging is considered to be a geriatric syndrome and often refers to loss of appetite and/or reduced food intake, beyond what is normally expected by physiological

aging. This is found in 30% of the elderly adults in the community and is associated with weight loss and higher mortality (67). There are a variety of factors associated with aging, responsible for the development of anorexia. The loss of taste and odor in the elderly is common and can be exacerbated by diseases and medicines and as a result, the intake of nutrients is adversely affected (68). As a result of gastrointestinal changes with age, gastric emptying is delayed and a feeling of satiety occurs after meals. In addition to delayed gastric emptying, some gastrointestinal hormones also change. Cholecystokinin has been reported to be five times higher in serum levels of glucagon-like peptide 1 and peptide YY hormone than in older adults. This change in hormone levels leads to increased satiety and reduced food intake (69). The secretion of ghrelin hormone, which has an appetite-enhancing effect, may decrease in age or disease. As a result, food intake decreases. Cytokines are also thought to play a role in the regulation of appetite. Aging is associated with an increase in glucocorticoids and catecholamines and a decrease in growth hormone and sex hormones. Increased levels of glucocorticoids, catecholamines, and serotonin may cause anorexia of aging (32).

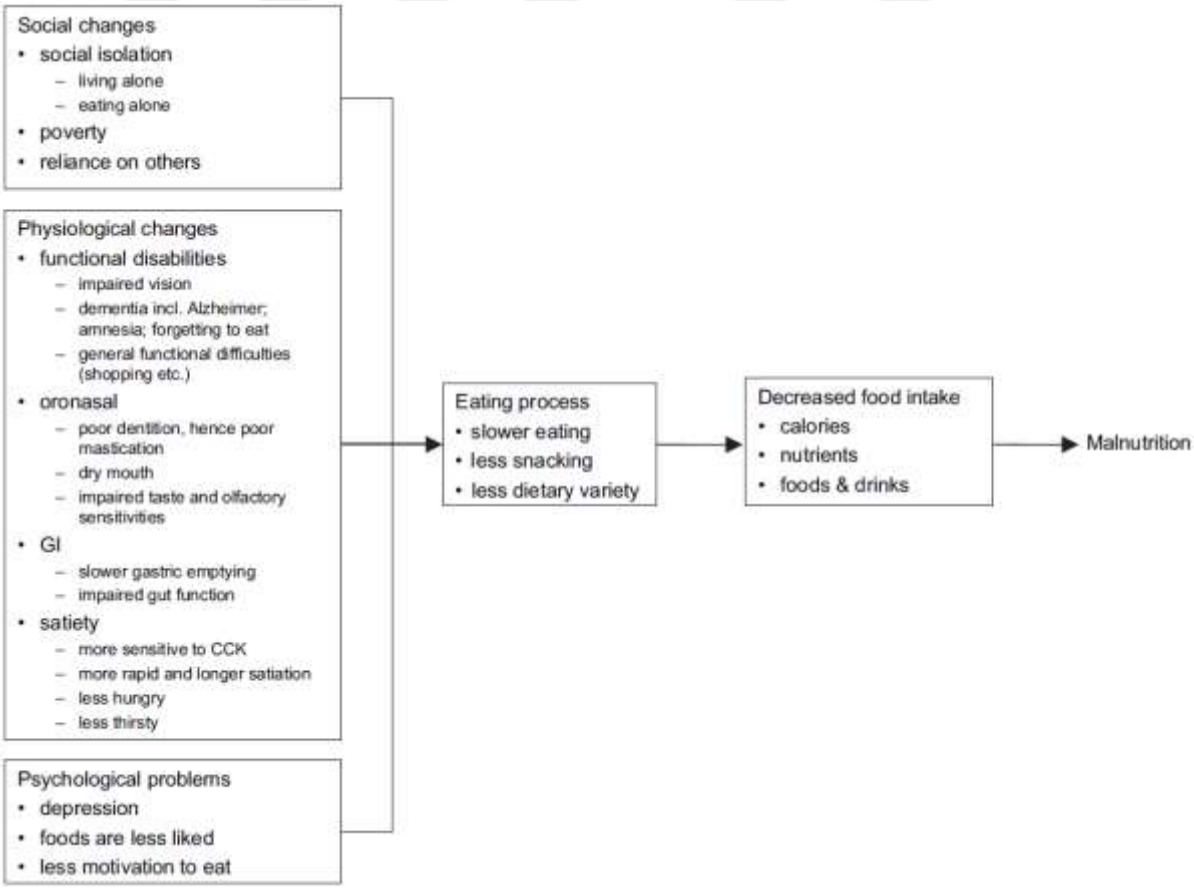
Diseases are one of the most important risk factors for malnutrition in the elderly. As acute and chronic diseases increase with age, older people are more affected by these diseases. The need for nutrients in the acute or chronic period due to the effects of diseases, nutrients intake and imbalances between the consumption emerges (70). Many diseases (chronic obstructive pulmonary disease, infection, rheumatoid arthritis, Parkinson's disease, hypermetabolism, cancer, gastrointestinal tract diseases, heart, liver, and kidney failure, etc.) increase energy requirements, reduce appetite and calorie intake and often lead to unintentional weight loss (61). Long-term multidrug use is common in this population group, as most elderly individuals are affected by chronic discomfort (71). A wide variety of medications can cause anorexia, xerostomia, or nausea, or affect smell and taste functions. In addition to these effects that suppress food intake, various drugs and gastrointestinal diseases can reduce the bioavailability of nutrients (72).

The presence of chewing and swallowing difficulty is another factor affecting the nutrient intake in elderly individuals. The absence of a tooth or prosthesis, poorly inserted prostheses, oral problems, and periodontal diseases may affect nutrient selection and energy intake (73).

In older people with psychological disorders such as confusion, dementia, and depression, malnutrition can be seen due to reduced appetite, refusing to eat or forgetting to eat (74). Older people are more likely to live alone than young adults, and social isolation is associated with reduced appetite and energy intake in the elderly (32).

Many negative changes occur in the way of life of the elderly individual, including in the age of economic, social, emotional and physical health. These changes include the death of the spouse, separation from family or friends, leaving work, living alone, lack of income, social isolation and deterioration of functional status. These changes may cause problems in the realization of daily life skills (purchase, preparation, cooking, and consumption of nutrients) or psychological (decrease in appetite, rejection of food) and lead to malnutrition of the elderly (75).

Figure 2.3. Social, physiological and psychological factors affecting food intake in older adults (66).



Inadequate nutrition in older adults has multiple and multifactorial consequences for health. Malnutrition may be the result of a disease and may be the cause. Malnutrition in residential areas and nursing homes is often associated with cognitive impairment, hypotension, infection, and anemia, and may cause physical performance deterioration in daily work, such as dressing and washing. In hospitals, the risk of complications such as malnutrition, prolongation of hospital stay, increased morbidity and mortality, fractures, infection, and specific nutritional deficiencies increase. Malnutrition can become an economic problem over time due to prolonged hospitalization and more intensive treatment of undernourished patients (76). According to a meta-analysis study, for elderly populations, overweight was not associated with mortality risk; however, mortality and comorbidity risk were found to be increased in elderly patients with BMI <23.0 kg/m^2 (77).

2.3.2. Obesity in Older Adults

The increase in total fat mass resulting from aging is associated with an increase in energy intake, a decrease in energy expenditure, or both. The results obtained from most studies show that energy intake does not change or even decrease with age. Therefore, a reduction in total energy expenditure leads to a gradual increase in body fat with advancing age (78). The clinical guidelines of the National Heart, Lung and Blood Institute define the BMI as between 25 and 29.9 kg/m^2 and overweight and over 30 kg/m^2 as obesity (79).

'Sarcopenic obesity', which is defined as the replacement of lean muscle mass with adipose tissue, is a frequent change in body composition in the elderly (80). With aging, there may be a redistribution of fat from the subcutaneous areas to the intraabdominal, intrahepatic and intramuscular regions. Sarcopenic obesity explains age-related muscle atrophy and increases in fat. The decrease in total energy expenditure, coupled with normal hormonal changes, results in an increase in total body fat. BMR, physical activity and muscle strength decrease with age. The production of testosterone and growth hormone responds to thyroid hormone and leptin (81). The etiology of sarcopenic obesity in the elderly is multifactorial and includes low metabolism, sedentary lifestyle, decreased

calorie and protein intake due to anorexia, low growth, and sex hormones and increased cytokine activity (80).

2.3.2.1. Prevalence of Obesity in the Elderly

Inadequate nutrition increases the risk of morbidity and mortality in the elderly and increases the risk of obesity, diabetes, hypertension, and cardiovascular disease. The prevalence of overweight and obesity continues to increase in the population as a whole, and the available evidence suggests that prevalence over 65 years of age is increasing (82). Obesity is an important public health problem. In the 1990s, while the prevalence of the elderly was approximately 32 million, 26.1% of this population had a BMI of more than 30. By 2008, while the prevalence of elderly people approached 40 million, the percentage of individuals with a BMI greater than 30 in this population has reached 39.5% (83). In a study evaluating European countries, obesity affects between 18 and 30% of individuals aged 65 and over (84).

In Organisation for Economic Co-operation and Development data, according to the analysis using the cut-offs for BMI according to the WHO standards, the 53,9% of adults over age 15 are overweight or obese in Turkey in 2016. In 2017, this number increased to 64.4% (85). In a study conducted in Turkey, the prevalence of obesity was analyzed according to age groups and regions. As a result of the study, 31% of 222 individuals over 60 years of age were normally weighted ($18.5 < BMI < 25$ kg/m^2), 36.5% were overweight ($25 \leq BMI \leq 29.9$ kg/m^2) and 29% obese ($BMI \geq 30$ kg/m^2) (86).

2.3.2.2. Causes and Results of Obesity

Aging is associated with significant changes in body composition and metabolism. A progressive decrease occurs in the body's Fat-Free Mass (FFM) after 20-30 years of age. Between the ages of 20-70, while 40% of FFM (mainly skeletal muscle) decreases, fat mass increases (87). Due to the loss of skeletal muscle, BMR is reduced by 2% to 3% every 10 years after 20 years, 4% every 10 years after 50 years, about 150 kcal/d. This decrease in basal metabolism and the decrease in physical activity duration and intensity cause a decrease in fat oxidation (88). Fat distribution also varies with age, especially in females there is an increase in visceral fat, which is more prominent than males. High

visceral fat is the main determinant of impaired glucose tolerance in the elderly. Increased intramuscular and intrahepatic fat causes impaired insulin action through locally released adipokines and free fatty acids (89).

There is a relationship between aging and decreasing growth hormone secretion. Hormonal changes may increase fat accumulation, decrease FFM and increase energy balance. The decline in testosterone production with growth hormone and age decreases FFM and increases fat mass (87). Obesity-related endocrine changes in the elderly include decreased estrogen levels, total testosterone, and free testosterone levels, increased prolactin and cortisol levels, changes in thyroid hormones (increased free T4 and reverse T3 and decreased T3 levels), and secondary hyperparathyroidism in the presence of low vitamin D levels. Changes in normal aging hormones appear to be associated with abdominal obesity and insulin resistance (89).

Elderly individuals with obesity often have muscle weakness, poor mobility, and higher fall rates. Chronic pain associated with aging and other comorbidities (arthritis, cognitive impairment) is other physical restrictions that increase functional losses (81). There is a decrease in daily life activities such as food, shopping, and travel. In addition, the harmful effects of overweight and obesity on the human body affect many organ systems. Obesity increases the risk of dyslipidemia, inflammation, increased total blood volume, hypertension, left ventricular hypertrophy and left atrial enlargement, which may lead to atrial fibrillation, systolic and diastolic left ventricular dysfunction and atherosclerotic heart disease (90).

Evidence from epidemiological studies suggests that overweight and obesity in the middle age group are associated with an increased risk of dementia. Obesity and sedentary behavior (a potential causal factor) are associated with an increased risk of molecular and cellular damage and, if untreated, may trigger the formation of age-related chronic diseases (91). High body weights are associated with an increase in all-cause mortality and also associated with hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, endometrial, breast, prostate and colon cancers, sleep apnea and respiratory problems (79). Obesity occurring in elderly adults is associated with newly formed or deteriorating disability, and weight loss therapy can improve physical function and quality of life. However, the main concern is malnutrition rather than overfeeding, as its association with morbidity and mortality is much stronger than that of obesity (77, 92).

2.4. Determination of Nutritional Status in Older Adults

Good nutrition status is one of the main determinants of healthy aging. Nutritional status of older adults is at risk as a result of various factors such as insufficient food consumption, chronic medical conditions and physical, economic and social factors (11). If there is any indication of nutritional risk, a thorough nutritional screening should be carried out to verify the malnutrition diagnosis and to define individual treatment goals and to develop a comprehensive nutritional care plan. Interventions should then be performed, checked for efficacy and corrected if necessary to achieve treatment goals (93). The risk of malnutrition and malnutrition is associated with an increase in mortality, regardless of the cause of death, and it is emphasized that nutrition screening is necessary to determine the elderly adults who will require nutritional support to minimize this condition (7). Early detection of nutritional risk and subsequent adequate nutritional intervention will contribute to maintaining muscle function and muscle strength, thus contributing to the maintenance of independence, quality of life and possibly long-term survival (94).

2.4.1. Nutrition Status Screening Tests

Screening of nutritional status is the first recommended step in this process, as it enables early detection of nutritional risks. Given the multifactorial of malnutrition in the elderly, and in the absence of a single objective measure or gold standard, a variety of nutritional screening tools specific to the elderly were developed (5). Nutritional assessment instruments usually include history, physical assessment, laboratory tests, calculation of caloric necessities, and indications for nutritional therapy (95).

A good assessment tool should meet certain specifications. The main criteria for selection are validity, reliability, ease of use, and convenience for assessors, acceptability for patients, acceptability for resource use (such as time and equipment), sensitivity and specificity (96). The most known index and scales used in the elderly are separated according to some characteristics. The Malnutrition Universal Screening Tool (MUST), the Nutritional Risk Index (GNRI), the Malnutrition Screening Tool (MST), and Nutritional Risk Screening 2002 (NRS 2002) only contain nutritional screening. The MNA includes both nutrition screening and evaluation. Subjective Global Assessment

(SGA) only includes nutritional assessment. Other screening tools include SNAQ (Short Nutritional Assessment Questionnaire), SCREEN II and DETERMINE (97). The application areas and purposes of some nutritional screening tests are given in Table 2.1.

Table 2.1. Nutritional screening tools used in the evaluation of malnutrition (98).

Screening tool test	Application and setting	Initial purpose
MNA	Validated in all settings	To detect malnutrition in the elderly
MUST	All community and hospital settings	To detect malnutrition in adult populations
SGA	Hospital, all clinical settings	To detect overt malnutrition
NRS-2002	Acute hospital	To detect malnutrition and identify patients who need closer monitoring
GNRI	Acute hospital, rehabilitation care, long term care	To detect malnutrition and its associations to postoperative complications for the elderly

2.4.1.1. Mini Nutritional Assessment (MNA)

In 2015, the guidelines on nutrition screening published by the ESPEN indicated that the most commonly used and recommended screening test in the elderly was the MNA test (10). MNA was developed by Vellas et al. in 1994 and accepted as an effective, standardized test for the detection and monitoring of the nutritional status of older adults. (99). The aim of MNA is to determine the presence of malnutrition and malnutrition risk in the home environment, nursing homes and hospitals (100). Today, the use of MNA by the ESPEN, the International Association of Gerontology and Geriatrics-IAGG and the International Academy of Nutrition and Aging-IANA is recommended (101). In a study

conducted in 2013, in Turkey, the long and short forms of the test MNA has been demonstrated to be a valid method for screening the elderly (102).

The long form of MNA contains 18 items collected in 4 sections. These four sections include anthropometric evaluation (BMI, body weight, arm and calf circles), general evaluation (lifestyle, acute disease, number of drugs, mobility, skin changes, depression and dementia symptoms), short nutritional assessment (number of meals, number of meals eaten, and help with fluid intake and eating) and subjective evaluation (self-perception of health and nutrition) (10). Loss of body weight is an early symptom of impaired nutritional status due to inadequate caloric intake and is a critical component of MNA. According to the results of the meta-analysis of 16 studies, unintentional weight loss in elderly people in the hospital is associated with depression, swallowing problems and lack of physical activity (103). The screening section of the MNA long form, consisting of 6 questions and with the highest score of 14, was developed by Rubenstein et al. and called MNA short form (screening). The questions are related to nutritional intake, weight loss, mobility, psychological stress or acute illness, depression or memory problems, as well as detection of BMI. If this result is less than 12 points, the long form of MNA with other questions is recommended to decide on malnutrition or to confirm malnutrition (70). It is stated that the short form has significant advantages for screening the nutritional status in routine health care, but is less efficient/effective for elderly individuals in nursing homes or other institutions (101).

According to the results of the MNA, the patient is categorized well-fed, nutritional risk or excessive nutritional deficiency. Numerous studies have shown that MNA has a good correlation with nutrient uptake, anthropometry, laboratory data, functionality, morbidity, hospital stay, and mortality (104). MNA short form classifies one as normally nourished (≥12 points), at risk for malnutrition (8-11 points), or malnourished (≤7 points). MNA long form classifies one as normally nourished (24-30 points), at risk for malnutrition (17-23.5 points), or malnourished (<17 points) (70). The MNA-long form is given in the appx 5.

2.5. Assessment of Nutritional Status in Older Adults

Assessment of nutritional status is necessary to prevent or control various chronic and acute diseases (30). A comprehensive nutritional status assessment and screening

includes a detailed history and physical examination, including anthropometric data and a specific nutritional assessment (105). Nutritional status assessments can lead to recommendations for improvement of the individual's nutritional status (e.g., some interventions, such as diet, enteral or parenteral nutrition, or advanced medical evaluation), or a re-screening recommendation (106). Assessment of nutrient intake is also essential for the planning of individual dietary interventions and is an important component of public health and nutrition policy. However, epidemiological research on dietary research or nutritional intake adequacy focuses on nutritional goals and over-consumption of certain nutrients, especially fat, saturated fatty acid, trans-fatty acids, sugar, sodium or cholesterol, depending on obesity or common dietary diseases (12).

When evaluating the nutritional status of elderly individuals, all information including nutritional and nutrient intake, psychological and social factors, physical function, diseases, laboratory values, and medicines are evaluated by considering many risk factors (11). In addition to these evaluation criteria, anthropometric measurements (body weight, body mass index, calf diameter, upper middle arm diameter, triceps skinfold thickness, etc.) allows the determination of malnutrition, excess weight and obesity, loss of muscle mass, fat mass gain and loss, and adipose tissue distribution. Therefore, it is an important part of nutrition assessment in geriatrics (13).

2.5.1. Anthropometric Measurements

Nutritional disorders are very common in the elderly and because they contain a high rate of morbidity and mortality, anthropometric measurements in clinical practice and epidemiological research constitute an important component of comprehensive assessments in the elderly (107). Anthropometric indicators are used to assess the prognosis of chronic and acute diseases and to guide medical intervention in the elderly. An anthropometric assessment by trained health professionals is inexpensive, non-invasive, and provides detailed information on the distribution of body structure, especially muscle and fat components, and helps assess the nutritional status of a population (13).

Changes in body composition at different stages of life vary, as reflected in anthropometric measurements, in men and women. Different anthropometric indicators

are used to assess nutritional status (108). Anthropometric measurements commonly used in the elderly; body weight, height, BMI, waist circumference, hip circumference, waist/hip ratio, upper middle arm circumference, calf circumference measurements and measurements of skinfold thickness (11). It is important to use reference anthropometric data from individuals of the same age group as they result in changes in body fat, height, and weight distribution as a result of changes in tissue elasticity in the aging process (109).

2.5.1.1. Body Composition Measurements

Body weight is inexpensive, simple and quick to obtain, physical measurement of the energy stores of older individuals. Accurate weight measurements are important for assessing nutritional status. The elderly person should be weighed at the same time by wearing the same type of clothing. Indicators such as edema and hydration status, which may affect body weight, should be recorded (11).

In cases where body weight cannot be measured, it can be calculated with a formula consisting of knee length, upper middle arm circumference, calf circumference, and subscapular skinfold thickness. Due to aging, changes in body fat and lean tissue, as well as physiological and morphological changes, the height is progressively shortened. It is difficult to measure the height in patients with chronic disease, arthritis, osteoporosis and Parkinson's-like neuromuscular system, spinal deformity (such as kyphosis, scoliosis) or bed-dependent elderly. In this case, the height can be calculated by measuring the knee length (109).

In the studies, it was pointed out that the height of the elderly is reduced. In the period that passes from adulthood to old age, it decreases by 1-2 cm in length every 10 years. As a result of the vertebra tightening, it is especially lost in the sitting height (110).

BMI is calculated body weight (in kg) divided by body height (in meters) squared. When height cannot be measured, knee height or arm opening can be used as an alternative method (111). The changes in body aging may affect BMI values because, during this process, loss of lean body mass and changes in the amount and distribution of adipose tissue are common. Especially in progressive sarcopenia in the form of visceral fat, it is particularly important for BMI values with simultaneous increase in body fat

mass. Due to these differences, the official BMI ranges for the elderly population may not be appropriate and their prognostic value may be insignificant (112). However, BMI is not reliable in the presence of factors such as edema or ascites, and it is meaningless in defining unintentional weight loss when evaluated alone (113).

According to the WHO standards, BMI categorizes underweight as <18.5 kg/m^2, normal 18.5–24.9 kg/m^2, overweight 25–29.9 kg/m^2, obese 30–39.9 kg/m^2 and extreme obesity >40 kg/m^2 in adults (114). Apart from the WHO classification, there is no consensus on the best intersection points for BMI in the elderly. However, the BMI of 22-27 kg/m² was associated with decreased functional capacity and the risk of cognitive loss in the elderly. The fact that the BMI is below 22 kg/m² is one of the major indicators of malnutrition in the elderly and has a negative impact on mortality (115). These two different BMI values were summarized in Table 2.2. High BMI values are associated with an increased risk of diabetes, vascular disease and hypertension in middle age, while low BMI value may be associated with increased cognitive decline in later life (116).

Bioelectric Impedance Analysis (BIA) can be used to assess fat mass and lean body mass. It is a cheap, fast, uncomfortable method. BIA provides body fat and lean mass as well as total body water, extracellular fluid and body cell mass. BIA is not appropriate for elderly patients with edema or dehydration due to congestive heart failure or kidney disease (109).

Table 2.2. BMI classification according to different reference values

	BMI cut-off points (kg/m^2)			
	Underweight	**Adequate**	**Overweight**	**Obese**
BMI (WHO)	<18.5	≥18.5 and <25	≥25 and <30	≥30
BMI	<22	≥22 and ≤27	>27	

2.5.1.2. Circumference and Skinfold Measurements

Another method for assessing nutritional status is the measurement of the middle upper arm circumference (MUAC). This measurement reflects the fat mass rather than the muscle mass. The current evidence suggests that a lower MUAC in elderly individuals is associated with increased mortality risk. MUAC may be a clinically useful indicator for assessing nutritional status in older people because it is fast, easy and inexpensive. The measurement requires only a tape measure and can be performed in both standing and sitting position (117). The arm is bent 90° from the elbow. The middle point between the acromial projection in the shoulder and the olecranon protrusion in the elbow is marked and the perimeter is measured with the measure (111).

Calf circumference is an anthropometric parameter that is closely associated with whole-body muscle mass and is known to be associated with the nutritional status of the elderly population (118). Studies have shown that in older adults the calf circumference of less than 31 cm is associated with disability in daily living activities and is used to predict the prevalence of sarcopenia (119). The MUAC and calf circumference, in addition to subcutaneous fats, reflect the body's muscle mass, thus indicating physical functional ability and body fat. Excessive weight loss, rather than excessive weight gain, is more a source of concern in geriatric health. It is therefore particularly useful in geriatric care to monitor changes in the circumference of the extremities, such as weight (or BMI) and arm and calf (120).

Measurements of the waist and hip circumference are other measures of anthropometric evaluation. Waist circumference is a good indicator of body obesity and especially abdominal fat. The waist circumference is determined by measuring the perimeter of the most midpoint between the lower rib and the crista ilia (111). It is recommended that waist circumference values be <94 cm in males and <80 cm in females by WHO. In males, 94-102 cm of waist circumference is considered to be a risk, and ≥102 cm is a high risk, whereas, in women, these values are 80-88 cm and ≥88 cm respectively. (121). Aging is associated with the distribution of adipose tissue with an increase in visceral fat. Measurement and proportions of the waist and hip circumferences allow a simple estimate of the distribution of body fat (108). The hip circumference is measured on the side of the individual during the measurement and the measurement is made at the widest point of the hip. The waist/hip ratio is calculated by dividing the waist

circumference to the hip circumference measurement (111). WHO reports that the waist/hip ratio is ≥0.9 cm in adult men and ≥0.85 cm in women is a risk for metabolic diseases (121).

Skinfold thickness measurements are highly correlated with densitometry predicted body fat. In order to obtain the best accuracy, fat thickness measurements should be combined from various parts of the body. However, if a single site was selected, various areas are the most accurate triceps skinfold thickness compared to the hydrostatic scale (109). In addition, triceps skinfold thickness is the most commonly used measurement of skinfold thickness measurements due to changes in body composition resulting in a decrease in skin elasticity and thickness (11).

2.5.2. Biochemical Data

In the laboratory evaluation of weight loss, complete blood count, glucose, electrolyte, kidney, and liver function tests, TSH, urine analysis and lung graph should be requested. In the evaluation of nutritional status, serum protein levels measured in the laboratory are used together with other parameters. Serum proteins used for this purpose are albumin, transferrin, and prealbumin (122). Although biochemical markers such as albumin, prealbumin, and transferrin are used in many malnutrition screening tools, they cannot be regarded as the determinants of nutritional status by themselves because they may be affected by other non-nutritional variables. For instance, serum albumin, which is frequently used as a nutritional status parameter, decreases in inflammatory diseases and is more indicative of metabolic stress in the hospital setting than in nutritional status (95).

Similar to albumin, the prealbumin is a negative acute phase protein produced by the liver and therefore affected by some of the same inflammatory conditions as infections and liver disease. Prealbumin is much shorter than half-life (2-3 days) compared to albumin and has a lower total amount in the body. Both of these factors allow the use of prealbumin as a more reliable indicator of acute changes in the nutritional status of the patient (123). Transferrin is a more sensitive indicator in the early period of protein-energy malnutrition but is affected by gastrointestinal disorders, iron deficiency, hypoxemia, chronic infection and hepatic disease (113). Due to its short half-life, it is more valuable than the album as a nutritional indicator at the theoretical level. In clinical

studies, such an advantage is not seen (124). The low total lymphocyte count is often a sign of weakening the immune system associated with malnutrition. Total lymphocyte count is affected by many other factors, so its usefulness as a measure of nutritional status in elderly adults is unreliable (11).

2.5.3. Clinical Assessment

The clinical evaluation of elderly individuals is multifaceted and involves the identification of physical, functional, cognitive and social factors that may limit the consumption of a balanced diet in terms of nutrition (11). Physical examination, especially hair, skin, muscle and mouth and clinical symptoms (e.g., fever, edema) indicate nutritional deficiencies and inflammatory activity. The decrease in plasma and cellular nutrient levels is effective in the clinical manifestations of the elderly, after inadequate intake of dietary nutrients, deterioration of absorption, or increased loss of body (125).

During clinical evaluation, elderly individuals should be questioned about diseases that may increase energy expenditure (for example, chronic obstructive pulmonary disease, dementia, pressure ulcers) or decrease in dietary intake (for example, paralysis, Parkinson's disease, dementia, depression, or geriatric anorexia). In addition, special attention should be given to the presence of oral and dental problems (chewing, xerostomia, bad teeth, and oral hygiene) in the anamnesis (126). Older adults may use more prescription medications than young adults because of age-related chronic diseases. For this reason, elderly people are at risk for side effects caused by drug-drug and drug-nutrient interactions and drug use during clinical evaluation should be taken into consideration (125).

2.5.4. Psychosocial Assessment

The nutrition of individuals can be affected by social and psychological factors. Therefore, behavioral changes can often be observed. The level of nutritional knowledge of the individual, the preparation and storage of nutrients, economic status, local and ethnic aspects of food should be determined and evaluated (127). There is cross-sectional

evidence suggesting that some social factors, such as social isolation and lack of social support, contribute to low-quality diets in advanced ages. The marital status, lifestyle, and frequency of interviewing with friends were related to diet quality. Understanding psychosocial effects on a diet are important for the development of future interventions to improve the quality of diet in older people (128).

2.5.5. Determination of Food Consumption Status

2.5.5.1. 24-Hour Recall

In the 24-hour recall method, the individual is asked for all the foods and beverages which he consumed in the last 24 hours and the best results are obtained when the interviewer is the dietitian/nutritionist. The interviewer should ask questions about foods that are frequently consumed to refresh the person's memory (109). Remembering methods can be achieved by using pictures showing the servings of foods, measuring containers, food and the size of the servings. It provides a rapid evaluation in hospital conditions, determining the consumption of food groups as servings and determining the amount of energy, protein, fat, and carbohydrates (127).

This method is commonly used to determine the nutritional consumption status because the individual has no responsibility (109). The 24-hour recall method is considered reliable and is often used in studies where the participant is over. It is better to repeat or frequent 24-hour reminders because of the day-to-day variability of the individual's food intake (11). In the use of a 24-hour food recall method, there are potential disadvantages, especially among older adults, that question their reliability or validity. Because of information, memory problems, or factors associated with the interview situation, individuals may not be able to reliably report food intake (129). This method is not used, especially in elderly patients with dementia (109).

2.5.5.2. Food Frequency Questionnaires

The frequency of food consumption and the consumption of food or groups of nutrients are determined as the frequency of the day, week or month and as the amount requested. Food consumption frequency method is often used to determine the

relationship between nutrition and disease risk. Food consumption frequency form depending on the purpose of individual foods or according to the characteristics of food (whole milk, half-fat milk, fat-free milk, etc.) can be prepared differently (111). The frequency of food consumption in studies confirms the information obtained when used in conjunction with 24-hour food consumption and informs the consumption pattern of the elderly (127).

2.5.5.3. Diet History

The diet history is a method with a combination of 24-hour consumption, food frequency questionnaires, and more comprehensive information. An experienced person, such as a dietician, who has been trained in the field of nutrition, is required. The effects of food preparation, cooking and storage methods on nutrient intake are evaluated (127).

A diet history provides information about the eating pattern any day, including occasional alternating foods, regular portion sizes, past changes in the eating pattern. Additional data on which foods are liked, allergies, oral and dental health, gastrointestinal factors, eating problems, ethnic and cultural preferences, socioeconomic factors, cooking pattern, health-related dietary restrictions, drug, and alcohol use can also be obtained (11, 130). Through a past diet history, it is a useful method for the relationship between diet and cancer or diet and chronic diseases to provide useful information about current food consumption habits, despite systematic prejudice (131).

2.5.5.4. Food Records of Current Dietary Intake

In the food recording method, the patient is asked to record where, when and how much food and drinks are consumed for a certain period of time. In order to minimize the effect of changes in the daily food intake of the individual on the evaluation of the available nutrient intake, it is generally preferred to record 3 (2 days on weekdays and 1 day on the weekend) or 7 days (11). The nutrient provided by each food is calculated. The average amount of food types and nutrients is determined by dividing the total of all days by the number of days (127).

Simple basic training is required to calculate the portion sizes of the foods consumed by individuals. Memory-related errors are minimized by this method because the nutrient record is made just after the meal. This method is likely to provide quantitatively accurate information about the nutrients consumed during the registration. This method is also useful for monitoring the effectiveness of nutritional interventions, as nutritional record management assesses changes in nutrient uptake. It is generally considered a time-consuming but gold standard when compared to other food consumption assessment methods (109).

2.6. Changes in Nutritional Needs with Aging

Elderly individuals need different amounts of nutrients with young people. While the need for some nutrients increases in old age, the needs of some remain the same or decrease (11). The recommended dietary allowance (RDA) is an adequate daily intake for the nutrient requirements of healthy individuals in the United States, which are used in other countries, which meet 97-98% of the nutrient requirements (132). According to the Nutrition Guide Special to Turkey, some of the energy and nutrient requirements of the elderly vary according to the adults (133).

2.6.1. Macronutrient and Fluid Recommendations in Older Adults

2.6.1.1. Energy Needs

Energy requirements for older adults vary considerably according to gender, body composition, and physical activity. The decrease in lean body mass, BMR and overall physical activity may lead to a general reduction in energy demand in older adults compared to young adults (57). Age-related changes in body composition cause a slight decrease in lean body mass. This decline is usually more common after 60 years of age. As a result, the basal metabolism or energy requirements for the elderly decrease by 100 kcal/day every ten years. Osteoarthritis and osteoporosis, as well as cardiovascular, pulmonary and neurological diseases, can alter energy requirements in the elderly by increasing energy consumption or by reducing the need for muscle loss due to inactivity (134).

In healthy and sick elderly patients, resting energy expenditure measurements are approximately 20 kcal/kg per day. Based on the usual physical activity levels between 1.2 and 1.8, the total energy expenditure varies from 24 to 36 kcal/kg per day (135). According to the current recommendations of geriatric specialists, the aim of nutritional support in undernourished elderly should be to provide total energy of 30-40 kcal/kg/day and to achieve protein intake of 1.2-1.5 g protein/kg/day. Nutritional needs vary from person to person and are dependent on physiological and pathological contexts. Current recommendations around the world show that the energy needs of individuals over the age of 50 are approximately 30 kcal/kg and 1.5 times the BMR to be adapted to the physical activity (136).

2.6.1.2. Carbohydrate and Fiber

There is no specific recommendation for the elderly in daily carbohydrate consumption. European Food Safety Authority (EFSA) recommends that the ratio of energy from carbohydrates be between 45-60%. EFSA has indicated that there is not enough data to allow the setting of a higher limit for 'total' and 'added sugars' in European Union countries. However, the WHO states that the simple sugar consumed daily should be less than 10% of total energy (137).

Cellulose, hemicellulose, lignin, pectin, resistant starch in the form of non-digestible carbohydrates are found in the content of fruits, vegetables, legumes, oilseeds, hard-shelled fruits, oats, bread and cereals made of whole-wheat flour. The protective and therapeutic effects of dietary fibers in the elderly are known (138). These carbohydrates, called dietary fiber, have beneficial effects on physiological activities such as intestinal transit time, the bioavailability of minerals and vitamins, protein digestion, cholesterol and lipid metabolism, glycemic and insulinemic response, and immune response (139). Recommendations for dietary fiber were established due to gastrointestinal function and adequate laxation. Based on available evidence about bowel function, it is stated that 25-30 g dietary fiber intake per day is sufficient for normal laxation (140).

2.6.1.3. Protein

Aging-induced physiological changes and decreased lean body mass cause total body protein reduction, leading to increased frailty, worsening of wound healing and reduced immune function (138). Therefore, the provision of adequate dietary protein is particularly important in elderly individuals to maintain muscle mass, promote wound healing, maintain skin integrity and immunity (141). The size and duration of the synthetic response in the postprandial muscle protein depend on the amount and quality of the protein consumed (142). The acceptable macronutrient distribution range for the protein is set between 10% and 35% of the total energy. The lower end of the distribution is approximately the same as the RDA (0.8 g/kg/day) and the upper end of the distribution is about 3g/kg/day (143). However, according to other studies, there is a need for 1-1.2 g protein/kg/day protein for a healthy elderly adult. It has been suggested that the elderly should be increased to 1.2-1.5 g protein/kg/day for undernourished or at risk (144). Although the role of dietary protein in preventing sarcopenia is unclear, protein intake more than this amount may be useful to increase muscle anabolism and reduce the progressive loss of muscle mass with age. Some experts suggest that a protein intake of 1.0 to 1.6 g/kg per day is safe and sufficient to meet the needs of healthy elderly adults (138).

According to data published by EFSA in 2012, it was concluded that information was insufficient to specifically determine protein requirements in older adults and that at least the same level (0.8 g/kg/day) of protein intake was necessary, as in young adults. Since inactive elderly adults have a lower energy requirement, the protein-to-energy ratio of this subgroup is higher than that of young adults (145). All this suggests that the recommended amount of protein should not be less than 12% of the total caloric intake, however, the renal function of the patient should also be taken into account (108).

2.6.1.4. Fats and Cholesterol

Fats are an important source of energy, facilitating the absorption of fat-soluble vitamins A, D, E and K and have vital structural and regulatory functions in the human body. However, high energy density due to excessive oil consumption can lead to overweight and obesity. Furthermore, the consumption of trans fatty acids is known to have adverse effects on cardiovascular health. On the other hand, it has been suggested

that monounsaturated fatty acids and polyunsaturated fatty acids (PUFA) have beneficial effects on human metabolic health, such as improving cardiovascular risk and insulin sensitivity (137). Omega-3 fatty acids have been proposed to have health-promoting properties in normal aging, including immune function, bone and muscle health, by reducing oxidative stress and inflammation (46). Low-grade systemic inflammation includes increases in the production of inflammatory factors such as C-reactive protein, tumor necrosis factor-alpha and interleukin 6, and is known to play a role in many age-related diseases. Since eicosanoids from 20 carbon polyunsaturated fatty acids are among the mediators and regulators of inflammation, the dietary balance of n-3 and n-6 PUFA is important (146).

Acceptable Macronutrient Distribution Ranges for Fats range from 20% to 35% of total calories for men and women aged 50 and older. Older adults should pay attention to choosing dietary fats in similar distributions to those recommended for young adults. Saturated fat should be limited to 8% to 10% of total calories, about 10% of polyunsaturated fats and 10% to 15% of monounsaturated fats (11). The daily intake of cholesterol should be below 300 mg. Daily intake of cholesterol should be less than 200 mg in individuals with high low-density lipoprotein-LDL cholesterol levels, diabetes mellitus and cardiovascular disease (147).

2.6.1.5. Recommendations for Fluid

Age-related changes in behavior and health status make all elderly individuals prone to dehydration. Elderly individuals may not notice the feeling of thirst due to changes in the activity of osmoreceptors. Forget about drinking water because of confusion, drowsiness or depression, and the medications used (such as diuretics) can also affect the person's fluid consumption. Reduction in renal atrophy decreased cortical blood flow, decreased glomerular filtration rate, and a decrease in maximal urinary concentration capacity may lead to electrolyte imbalances and increased water diuresis (148). In the studies conducted, 9-10% of the hospitalized inpatients were diagnosed with dehydration related to prolonged stay and mortality in the hospital, independent of age, gender and comorbidities (149).

Adequate fluid intake in elderly adults helps to promote good physical and mental functions by reducing the risk of cognitive impairment, confusion, constipation, hospitalization and repeated hospitalizations (150). WHO recommends daily water

consumption as 30 ml/kg. The minimum consumption should be 1.5 L/day (137). Recommendations for adequate fluid intake in elderly adults are usually based on studies conducted in young adults. According to EFSA and Nutrition Guide Special to Turkey, it provides 2.0 L/day for women and 2.5 L/day for men of all ages (from a combination of drinking water, beverages, and food) for adequate consumption of fluids (151).

2.6.2. Micronutrient Recommendations in Older Adults

Older adults are susceptible to deficiencies in various micronutrients due to reduced intake of foods rich in vitamins and minerals. Micronutrients are very important for maintaining normal physical and cognitive functions in the aging body, and inadequate intake may lead to a deterioration of health and the development of certain diseases (137). The mechanisms by which micronutrients mediate their protective effects on age-related disorders are based on their ability to prevent the formation of free radicals or to clean them directly or indirectly when they occur (31). Even if some micronutrients need to be increased in later ages, these amounts can be easily achieved in a healthy and balanced diet that meets energy and macronutrient recommendations. Micronutrient deficiency may occur in cases such as lack of appetite or limited access to food, gastrointestinal disease, disease or operative status, drug-nutrient interactions, and micronutrient supplementation may be required in these cases. Vitamin A, C, D, B12, folate, calcium, zinc, magnesium and iron are among the deficiencies of microbes seen more frequently in aging (57). According to the ESPEN, there is limited evidence for healthy older adults, so recommendations for older adults remain the same for adults aged between 19 and 50, excluding vitamin D, B6, B12, iron, and calcium (152).

Micronutrients, which are emphasized as important for older adults, primarily include calcium and vitamin D in maintaining bone mineral density and fracture prevention. Calcium plays an important role not only in the prevention and treatment of osteoporosis but also in the stabilization of cell membranes, impulse delivery in the nervous system and blood clotting. Absorption, metabolism, and calcium elimination are affected by many factors and their effects are more common in the elderly (147). Vitamin D deficiency (serum levels of 25 [OH] D <50nmol/L [20 ng/mL]) is common in elderly patients and is associated with adverse outcomes (132). Vitamin D deficiency, oxalates, phytates, pulp, high fat, and phosphate intake, increased intestinal motility, some diseases

(Crohn, celiac disease), drugs (glucocorticoids, anticonvulsants) can affect the absorption of calcium (147). Low intake of vitamin D rich foods, concomitant drug use that disrupts vitamin D absorption, and medical conditions and sun exposure are associated with the decrease in vitamin D levels in the elderly population (6). Deficiency of this vitamin leads to osteomalacia, rickets, and myopathy. Reduction of bone density is associated with decreased mobility, increased risk of falling, and possibly increased the risk of developing type 1 diabetes, cardiovascular disease and rheumatoid arthritis (4). According to a meta-analysis of numerous studies done in older individuals, 800 international unit (IU) D3 vitamin taken daily, combined with good calcium intake, confirms that the risk of fracture is reduced by 10-20% (153).

Vitamin B12 deficiency increases with age. Isotropic gastritis is the main cause of deficiency affecting 10% to 30% of individuals over 60 years of age. In addition, acid-reducing drugs can affect the absorption of vitamin B12 (154). Decreased gastric acid secretion with age is a common finding associated with factors such as chronic atrophic gastritis in the elderly, chronic proton pump inhibitor use, vagotomy, or gastric resection. As a result, hypochlorhydria formed can lead to impaired digestion and may reduce the absorption of iron, calcium, folate, vitamin B6 and vitamin B12. Vitamin B12 deficiency is associated with hematological and neuropsychological problems. Depending on the severity of the deficiency, severe complications such as polyneuropathy, paresthesia, confusion, dementia, and pancytopenia may occur (6). Folate deficiency is associated with an increased risk of chronic disease that may have a negative impact on the health of elderly people. Hyperhomocysteinemia, an important risk factor for atherosclerotic vascular disease, may lead to increased risk of changes in DNA and cognitive dysfunction, which can cause pro-carcinogenic effects (155).

Magnesium plays an important role in the prevention of cardiovascular diseases, hypertension, osteoporosis, and diabetes. The greatest loss of magnesium is found in alcoholics, diabetics, and patients treated with certain diuretics. Hypocalcemia and hypopotassemia are also associated with hypomagnesemia (108). Diet recommendations for magnesium in older adults are the same for young adults. The rich sources of magnesium include hazelnuts, legumes, whole grains and most green vegetables (57).

Selenium, which protects against cardiovascular disease, stimulates the immunological system and is associated with cancer prevention. Selenium has been

shown to play an important role in muscle retention, especially in grip strength. This is because selenoenzymes protect the muscles against oxidative effects. Selenium intake decreases in older adults, so the daily recommendation for this age group is 50-70 μg/day (108). Sodium is another important mineral that needs attention. It is estimated that the average intake in older adults is higher than the recommended amount (2.300 mg/day). High sodium intake in the diet is risky for hypertension and cardiovascular disease, and the presence of these diseases is associated with reduced cognitive function (156). According to the Turkey Dietary Guidelines and RDA values of daily energy and nutrient requirements for the elderly are shown in Table 2.3 (133,157).

Table 2.3. Daily energy and nutrient reference values for older adults (133, 157).

Energy and nutrients	Amounts of Requirements			
	Male		Female	
	Turkey Dietary Guidelines	RDA	Turkey Dietary Guidelines	RDA
Energy (kcal)*	1860	2000	1480	1600
Protein (%)	12-20	10-35	14-20	10-35
Protein	0.83-1.04 (g/kg)	0.8 g/kg	0.83-1.04 (g/kg)	0.8 g/kg
Carbohydrate (%)	45-60	45-65	45-60	45-65
Carbohydrate (g)	130	130	130	130
Fiber (g)	25	21	25	30
Fat (%)	20-35	20-35	20-35	20-35
Vitamin A (mcg)	750	900	650	700
Vitamin D	15-20 (mcg)	800 IU	15-20 (mcg)	800 IU
Vitamin E (mg)	13	15	11	15
Vitamin B_1 (mg)	1.2	1.2	1.1	1.1
Vitamin B_2 (mg)	1.3	1.3	1.1	1.1
Niacin (mg)	6.7	16	6.7	14
Vitamin B_6 (mg)	1.7	1.7	1.5	1.5
Vitamin B_{12} (mcg)	4	2.4	4	2.4
Folic acid (μg)	330	400	330	400
Vitamin C (mg)	110	90	95	75
Sodium (mg)	1.2	1.2	1.2	1.2
Potassium (mg)	4.7	4.7	4.7	4.7
Calcium (mg)	950	1200	950	1200
Magnesium (mg)	350	420	300	320
Phosphor (mg)	550	700	550	700
Iron (mg)	11	8	11	8
Zinc (mg)	9.4-16.3	11	7.5-12.7	8

** The energy requirement was given according to the 50 percentile average of 60-69 and 70-79 age groups and the group with 'less active' physical activity level.*

Nutrients that are suitable for the needs of the individual from the food groups in old age should be selected and sufficient energy and nutrients should be taken to the body. According to this, food consumption should be provided from a group of milk and dairy product, group of meat, egg, and legumes, group of vegetables and fruits and group of cereals (127). The approximate amounts of daily foods to meet the energy and nutrients in older adults in Turkey Dietary Guidelines are given in Table 2.4 (133).

Table 2.4. Recommended amounts of foods to meet daily energy and nutrients in older adults (133).

	Amounts of Foods (g / day)	
Food groups and foods	**Male**	**Female**
Group 1: Dairy Products		
Total	600	600
Milk, yogurt	450	450
Cheese	30	30
Group 2: Meat, Egg, Legumes		
Total	130	130
Meat, chicken, fish	100	100
Egg	10	10
Legumes	20	20
Group 3: Vegetable and Fruit		
Total	600	600
Green and yellow vegetables and fruits	200	200
Other vegetables and fruits	400	400
Group 4: Cereals		
Bread	200	125
Rice, bulgur, pasta, flour	60	40
Group 5: Oil and Sugar		
Total oils	30	20
Solid oil	15	10
Liquid oil	15	10
Total desert	50	40
Sugar	30	20
Jam, honey, molasses, etc.	20	20

3. MATERIALS AND METHODS

3.1. Research Site, Period and Sample Selection

This study has been performed between the dates May 2018 – November 2018 on 215 volunteers at or above the age of 65, consisting of 70 males and 145 females, who are outpatients in the Geriatrics Clinic of Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty. As per exclusion criteria; individuals who are not outpatients in the Geriatrics Clinic of the study, who are 64 years old and below, who had Standardized Mini-Mental State Examination (SMMSE) scores of 23 points and below for the test applied in the clinic, and individuals who have not volunteered for participating in the study, have been excluded from the study.

To determine the number of participants, a power analysis has been performed: when the malnutrition is assumed to be 6% in the elderly population according to literature findings, a confidence level of 95% and a margin of error of 5% be taken into consideration; 213 elderly people is calculated to be included in the study.

The trial has been conducted with the ethics committee approval nr. 370668608-6100-15-1480 of Yeditepe University Clinical Trials Ethics Committee determined in the committee meeting dated 18.04.2018 (Appx 1). Before the ethics committee approval, research permission was obtained from the head of Geriatrics Department of the Hospital (Appx 2). General information about the trial has been supplied to individuals participating in the trial, and informed consent form was read and signed by each participant (Appx 3).

3.2. General Plan of Research

After obtaining informed consent from all individuals in the study, the SMMSE score of the individuals was evaluated. Nutritional habits and food consumption assessment form was applied in a face-to-face interview. In addition to this form, in order to evaluate nutritional habits and nutritional status, a 24-hour food consumption record for the previous day was requested and a monthly food consumption frequency form was applied to all individuals, and MNA-long form was used for nutritional risk assessment.

In the meantime, some anthropometric measurements (body weight, height, BMI), mid-upper arm circumference, waist, and hip circumference, calf circumference) were performed, and obtained data was recorded (Appx 4).

SMMSE, which was an inclusion criterion, has been used for the quantitative evaluation of cognitive performance in standard neuropsychiatric examination methods. In 2002, its validity and safety were tested on 212 patients in Turkey, whose average age was 77 and 71 of whom had dementia, and its safety between different practitioners was determined. It consists of eleven items under five main topics that are a tendency, recording memory, attention and calculation, recall and language, and it is assessed over a total score of 30. The ideal threshold value in Turkish society was selected as 23/24, and it was determined to be valid and safe for the diagnosis of mild dementia (158). SMMSE was applied to each patient in the study clinic by the physician. Test scores of individuals have been reviewed from their healthcare documents before the study.

3.3 Data Collection

3.3.1. Determination of General Information and Nutrition Habits

In order to evaluate general information and nutritional habits of individuals, an evaluation form regarding nutritional habits and food consumption in the weight management of elderly individuals from Patient Monitoring Guidelines of Dietitians has been used (159).

In the first part of the survey, questions on age, gender, educational status and profession, marital status, number of children, residence, frequency and reason of doctor visits, history of falling, present diseases, drug use, dieting status, the person who has recommended the diet, chewing-swallowing difficulties, questions about tooth losses, and information on smoking and alcohol intake were questioned in the patient interview in order to determine personal information of the patient.

In the second part of the survey, in order to determine nutritional habits and status, patients were questioned about water consumption, nutritional habits (number of meals, meal skipping status, reasons of meal skipping, routine of meal hours), their preference of snacks between meals, status of appetite, salt consumption, enteral products, and use

of vitamin-mineral supplements. In the third part, regular physical activities and physical disabilities were questioned (Appx 4).

3.3.2. Determination of Food Consumption Status and Frequency

A 24-hour retrospective food consumption record for a single day was requested from the patients (109) (Appx 4). All food and beverages consumed in the last 24 hours were asked to the individual and recorded by the investigator. "Photo Catalog of Food and Drinks: Measurements and Amounts" was used for the determination of the consumed portions and amounts of food (160). The photos in the catalog were shown, and the individual was questioned about the amount they ate from each food.

From the food consumption records requested by the investigator, nutrient-based contents were investigated, and standard recipes were used for foods consumed while eating outside of the home (161). Enteral products, and vitamins and/or minerals have not been included in food consumption.

Patients were questioned about food consumption frequency of various foods in the last month, including milk group, meat group, vegetables-fruits, grain group, fats, sugars, packaged foods, and other food and beverages, and these were recorded. The individuals were asked whether they generally consumed each of these foods in "every meal", "every day", "1-2 times a week", "3-4 times a week", "5-6 times a week", "once in 15 days", "once in a month" and "never", and to select a suitable frequency category (Appx 4).

Data obtained with the 24-hour retrospective food consumption record has been analyzed with Nutrient Databank and Nutrition Information System-BeBiS version 7.2 computer program. Daily energy and nutrient intake levels were assessed from the mean, standard deviation, and lower and upper values. Daily food consumption levels and daily energy and nutrient sufficiency levels have been assessed by comparing with reference information in Turkey Dietary Guidelines (133) and RDA (157) levels.

3.3.3. Mini Nutritional Assessment

For the screening of nutritional status in the elderly; MNA- long form, which was developed by Vellas et al. and validity-safety study of which has been performed for elderly individuals, has been used (See Appx 5). The purpose of MNA is to determine malnutrition in homes, nursing homes and hospitals, and malnutrition risk in the elderly (100). MNA long form contains 18 elements in 4 parts. These four parts consist of anthropometric assessment (BMI, body weight, circumference of arms and calves); general assessment (lifestyle, drugs, mobility, depression and dementia signs); short nutritional assessment (number of meals, food and fluid intake, nutritional autonomy) and subjective assessment (the perception of self about health and nutrition) (10). The scores of each part are calculated by the addition of points given to the answers of the questions in that part. In MNA screening test, scores above 12 points were recognized to be normal, 11 and below as malnutrition risk, and 7 and below as malnutrition; and according to the total score of MNA, 24 points and above were considered as normal; scores between 17-23.5 as malnutrition risk, and below 17 points as malnutrition (70).

3.3.4. Determination of Anthropometric Measurements

In this study, the body weight of elderly individuals was measured while wearing clothes and without shoes by using an EB615 model Freely scale that is sensitive to 100 grams, has a digital display and has been calibrated before the measurement (111).

Height was measured by using a measuring tape, by standing straight without shoes, joining feet side-by-side and ensuring contact between heels and the wall, while looking ahead and aligning upper margins of ears and outer corners of the eyes on a horizontal line parallel to the plane (Frankfort Plane) (110).

Body Mass Index (kg/m^2) was determined with the equation body weight(kg)/height(m^2) for all individuals. BMI cut-off values determined recommended by WHO and BMI cut-off values which are accepted as risk values for mortality were used in the evaluation of BMI (114, 115). These values were shown in Table 2.2.

While measuring MUAC, the arm was bent 90° from the elbow, the middle point between acromial end at the shoulder and olecranon in the elbow was marked, and

measurement was performed with a non-stretch measuring tape (111). MUAC was assessed according to reference values provided in MNA-long form in Appx 5.

Waist circumference was measured when the individual was standing, the stomach was the normal-in loose position, the arms were extended and the legs were connected. After determining the middle point between the lowest rib and iliac crest, waist circumference measurement was performed at this point with a non-stretch measuring tape (111). WHO recommends waist circumference values to be below 94 cm in men and below 80 cm in women. Waist circumference values between 94-102 cm in men indicate risk and values ≥102 cm is assessed as high risk; corresponding values for women are 80-88 cm and ≥88 cm, respectively. Waist circumference intercept values recommended by WHO have been used in the assessment of waist circumference (121). Measurement of hip circumference was performed from one side of the individual's body and the widest point was measured with a non-stretch measuring tape (111). Waist/hip ratio was calculated by dividing waist circumference measurement to hip circumference measurement. WHO reports that waist/hip ratios of ≥0.9 cm in grown men and ≥0.85 cm in women indicates risk for metabolic diseases (121).

While measuring calf circumference, the soles of feet were pressed on a hard and flat floor and the leg was supported. The circumference of the widest point for the calf was determined by adjusting the measuring tape up and down, and the measurement was taken after finding the widest point (110). It was shown in many studies that calf circumference below 31 cm in elderly adults was associated with disability in daily life activities and that it was used to estimate the prevalence of sarcopenia (119).

3.4. Statistical Methods

All obtained data were analyzed with SPSS 25.0 statistics program. Numeric variables were denoted with by mean, Standard Deviation (SD), median, lower and upper values, and categorical variables were denoted by a number (n) and percentage (%). Normal distribution of data was checked with Kolmogorov-Smirnov and Shapiro-Wilkinson tests. In the comparison of two groups; Independent Samples t-Test was applied for variables with normal distribution. Chi-Square Test (χ^2) was applied in the comparison of qualitative variables between two groups, and the relation between

variables was tested with Pearson Correlation. In order to control confounding factors, logistic regression analyses were performed. The confidence interval was determined as 95% in all analyses, and results were assumed to be statistically significant for $p<0.05$ values.

4. RESULTS

This study was conducted with a total of 215 patients, consisting of 70 males (32.6%) and 145 females (67.4%), who have applied to Geriatrics Outpatient Clinic of Istanbul University-Cerrahpasa Cerrahpasa Medical Faculty. The distribution of demographics was demonstrated in Table 4.1 for the study group. Mean age of men who have participated in the study was 78.6±6.8, while it was 74.9±6.9 in women. Forty four point two percent of all individuals in the study were between 75-85 years old, while 42.8% were between 65-74 years old, and 13% was 85 years old and above. While 48.6% of men were between 75-64 years old, 49.0% of women were between 65-74 years old. A statistically significant difference was determined in the study between genders for age distribution (χ^2=10.051, p<0.01). Accordingly, age intervals of men were significantly higher compared to women.

Upon examining the educational status of the study group, it was observed that 2.9% of men and 9.7% of women were illiterate. Twenty percent of men and 11% of women were university graduates. While 44.2% of individuals (41.4% of men, 45.5% of women) were primary school graduates, 20% were (22.9% of men, 18.6% of women) were high school graduates, and 9.8% (10.0% of men, 9.7% of women) was secondary school graduates. No statistically significant difference was determined in the study between genders for educational status (χ^2=6.977, p>0.05) (Table 4.1).

Upon examining the marital status of the study group, 54% of all individuals were determined to be married. It was observed that 80% of men were married and 20% were single, and 41.4% of all women were married, while 58.6% were single. A statistically significant difference was determined between genders for marital status (χ^2=28.343, p<0.01). While 88.6% of all men who have participated in the study were retired, 11.4% were still working. Moreover, 31.7% of women were retired, 64.8% were housewives, and 3.4% were still working. Among all of the elderly individuals in the study, 97.2% were staying in their homes, while 2.8% were staying in retirement homes. 16.3% of all elderly individuals lived alone, consisting of 8.6% of men and 18.6% of women (Table 4.1).

Table 4.1. Assessment of study group according to demographic characteristics

	Males (n=70)		Females (n=145)		Total (n=215)		p*
	n	**%**	**n**	**%**	**n**	**%**	
Age (years)							
65-74	21	30.0	71	49.0	92	42.8	
75-84	34	48.6	61	42.1	95	44.2	**0.00****
≥85	15	21.4	13	9.0	28	13.0	
Mean Age***	78.6 ± 6.8		74.9 ± 6.9		76.1 ± 7.0		
Educational Status							
Illiterate	2	2.9	14	9.7	16	7.4	
Literate	2	2.9	8	5.5	10	4.7	
Primary school	29	41.4	66	45.5	95	44.2	0.22
Secondary school	7	10.0	14	9.7	21	9.8	
High school and equivalent	16	22.9	27	18.6	43	20.0	
University/Master/Doctorate	14	20.0	16	11.0	30	14.0	
Marital Status							
Married	56	80.0	60	41.4	116	54.0	**0.00****
Single	14	20.0	85	58.6	99	46.0	
Working Condition							
Housewife	-	-	94	64.8	94	43.7	
Retired	62	88.6	46	31.7	108	50.2	
Working	8	11.4	5	3.4	13	6.0	
Residence							
Home	68	97.1	141	97.2	209	97.2	
Retirement home	2	2.9	4	2.8	6	2.8	
Cohabitants							
With spouse	45	64.3	45	31.0	90	41.9	
With spouse and children	11	15.7	14	9.7	25	11.6	
With children	5	7.1	51	35.2	56	26.0	
Alone	6	8.6	27	18.6	33	15.3	
With caretaker	1	1.4	1	0.7	2	0.9	
Other*****	2	2.9	7	4.8	9	4.2	

Chi-square test, **p<0.05, *$\bar{X}$±SD, ****Other people the subjects were staying with are determined as: their sibling (n=6) and mother (n=1)*

Current diseases were evaluated for the individuals in the study and they are shown in Table 4.2. It was observed that 70.7% of elderly individuals had hypertension, 54.4% has osteoporosis, 43.7% had cardiovascular disease, 42.3% had diabetes, 33% had a history of falling, 29.8% had gastrointestinal disease, 24.2% had hyperlipidemia, and 18.6% had renal disease. The most common diseases in men were hypertension (70%), cardiovascular disease (52.9%), osteoporosis (41.4%), and diabetes (38.6%), respectively, while it was hypertension (71%), osteoporosis (60.7%), diabetes (44.1%) and cardiovascular disease (39.3%) in women. The prevalence of osteoporosis in women was higher than men, and this difference was determined to be statistically significant (χ^2=7.061, p<0.01). History of falling, fractures or cracks was higher in women (37.2%) compared to men (24.3%). A statistically significant difference was determined between genders for the history of falling, fractures or cracks (χ^2=3.583, p<0.05). The prevalence of hyperlipidemia was 14.3% in men, and 29% in women. A statistically significant difference was determined between genders for hyperlipidemia prevalence (χ^2=5.548, p<0.01).

Table 4.2. Distribution of current diseases in the study group

Current Diseases*	Males (n=70)		Females (n=145)		Total (n=215)		p*
	n	%	n	%	n	%	
Hypertension	49	**70.0**	103	**71.0**	152	70.7	0.87
Osteoporosis	29	**41.4**	88	**60.7**	117	54.4	**0.00****
Cardiovascular disease	37	**52.9**	57	**39.3**	94	43.7	0.06
Diabetes	27	**38.6**	64	**44.1**	91	42.3	0.43
Other***	22	**31.4**	50	**34.5**	72	33.5	0.65
Falling, fractures, cracks	17	**24.3**	54	**37.2**	71	33.0	**0.04****
Gastrointestinal disease	19	**27.1**	45	**31.0**	64	29.8	0.55
Hyperlipidemia	10	**14.3**	42	**29.0**	52	24.2	**0.01****
Renal disease	16	**22.9**	24	**16.6**	40	18.6	0.26
Respiratory disease	15	**21.4**	22	**15.2**	37	17.2	0.25
Iron deficiency anemia	8	**11.4**	29	**20.0**	37	17.2	0.11
Rheumatic disease	6	**8.6**	23	**15.9**	29	13.5	0.14
Depression	8	**11.4**	19	**13.1**	27	12.6	0.72
Cancer	5	**7.1**	8	**5.5**	13	6.0	0.63

** Several options have been marked. **p<0.05. ***Other current diseases have been determined as allergy (n=3), eye conditions (n=11), neurological disease (n=24), prostate (n=2), thyroid disease (n=31) and sleep apnea syndrome (n=1).*

Older adults participating in the study were questioned about the number of drugs used daily, and whether they used vitamin and/or mineral supplements (food supplements). As seen in Table 4.3, 47.4% of all individuals used 5 drugs and below, while 52.6% used more than 5 drugs. Forty-seven point one percent of men and 55.2% of women used more than 5 drugs, and no statistically significant difference was determined for the drug use category between genders (χ^2=1.221, p>0.05). It was observed that 53% of all individuals used vitamin and/or mineral supplements upon examining. Even though women (55.2%) had higher use of vitamin and/or mineral supplements than men (48.6%), no statistically significant difference was determined between genders for the use of food supplements (χ^2=0.826, p>0.05). Upon examining the type of supplements used, it was determined that 51.8% of individuals used vitamin D, 26.3% used vitamin B12, 14.9% used Omega-3, and 11.4% used multivitamin-mineral combinations.

Table 4.3. Distribution of drug and food supplement use in the study group

Drug and food supplement use	Males (n=70)		Females (n=145)		Total (n=215)		p*
	n	%	n	%	n	%	
Number of Drugs Used							
≤5	37	52.9	65	44.8	102	47.4	0.26
>5	33	47.1	80	55.2	113	52.6	
Food Supplement Use							
Yes	34	48.6	80	55.2	114	53.0	0.36
No	36	51.4	65	44.8	101	47.0	
Used Food Supplements**	***n=34***		***n=80***		***n=114***		
Vitamin D	23	67.6	36	45.0	59	51.8	
Vitamin B12	11	32.4	19	23.8	30	26.3	
Omega-3	5	14.7	12	15.0	17	14.9	
Multivitamin-minerals	2	5.9	11	13.8	13	11.4	
Iron	2	5.9	10	12.5	12	10.5	
Other***	4	11.8	15	18.8	19	16.7	

**Chi-square test, **Several options have been marked, ***Other food supplements have been determined as; calcium (n=15), magnesium (n=2) and vitamin B (n=2)*

Application of diet program for any disease in the study group is presented in Table 4.4. Of study participants, 19.5% stated that they had applied a dietitian-recommended diet for a disease, and 80.5% stated they had not applied any diet. Upon examining the type of disease for the applied diet programs, it was determined that 52.4% applied a diet for diabetes, 42.9% for hypertension, 19% for hyperlipidemia, 9.5% for cardiac disease, and 9.5% for obesity.

Table 4.4. Distribution of diet program application in the study group

	Yes		No	
	n	**%**	**n**	**%**
Diet Application Status	42	19.5	173	80.5
Diet Application for Disease*				
Diabetes	22	52.4	20	47.6
Hypertension	18	42.9	24	57.1
Hyperlipidemia	8	19.0	34	81.0
Cardiac disease	4	9.5	38	90.5
Obesity	4	9.5	38	90.5
Renal disease	1	0.5	41	97.6
Cancer	1	0.5	41	97.6
Osteoporosis	1	0.5	41	97.6
Stomach disease	1	0.5	41	97.6

**Several options have been marked.*

Presence of difficulties in chewing-swallowing, tooth loss, and any tooth problems were questioned, and they are demonstrated in Table 4.5. Of elderly individuals, 23.7% stated they had difficulties in chewing-swallowing. The rate of men with difficulty in chewing-swallowing was 24.3%, while it was 23.4% in women. No statistically significant difference was determined between genders for difficulty in chewing-swallowing (χ^2=0.018, p>0.05). Thirty point two % of elderly individuals stated they had tooth loss, of these elderly people, 32.9% of men and 29% of women had tooth loss while 54.9% stated they used a full dental prosthesis, and 14.9% stated they didn't have tooth loss. No statistically significant difference was determined between genders for tooth loss (χ^2=1.043, p>0.05). Fifty five point three percent of elderly individuals did not experience any problems while eating due to any obstacles related to tooth problems, 38.6% faced problems for only solid foods and 6% experienced problems for all foods. Although 40.7% of women and 34.3% of men experienced problems while eating solid foods, no statistically significant difference was determined between genders for obstacles due to tooth problems (χ^2=1.727, p>0.05).

Table 4.5. Evaluation of difficulties in chewing-swallowing and tooth problems in the study group

	Males (n=70)		Females (n=145)		Total (n=215)		p*
	n	%	n	%	n	%	
Difficulty in chewing-swallowing							
Yes	17	24.3	34	23.4	51	23.7	0.89
No	53	75.7	111	76.6	164	76.3	
Tooth loss							
Yes	23	32.9	42	29.0	65	30.2	
Yes, I use full dental prosthesis	35	50.0	83	57.2	118	54.9	0.59
No	12	17.1	20	13.8	32	14.9	
Obstacles due to tooth problems							
No	43	61.4	76	52.4	119	55.3	
Yes, but only in solid foods	24	34.3	59	40.7	83	38.6	0.42
Yes, nearly in all foods	3	4.3	10	6.9	13	6.0	

**Chi-square test*

Appetite status of the elderly individuals in the study, number of main meals and snacks in one day, whether or not they skipped meals, the meal they skipped and its reason have been questioned and demonstrated in Table 4.6. Fifty one point six percent of elderly individuals had a normal appetite, 38.2% had a good appetite and 10.2% had a poor appetite. The rate of men with poor appetite was 11.4% and it was 9.7% in women. No statistically significant difference was determined between genders for the state of appetite in elderly (χ^2=0.844, p>0.05). The rate of elderly individuals who ate 3 meals in one day was 66.5%. Thirty percent of men and 35.2% of women ate 2 main meals in one day. No statistically significant difference was determined between genders for the number of main meals in elderly individuals (χ^2=0.567, p>0.05). Fifty three percent of elderly individuals ate 1 snack in one day, 38.6% ate 2 snacks, 5.6% ate 3 snacks, and 2.8% had no snacks. 61.4% of men and 49% of women only had 1 snack in one day.

Twenty four point two percent of elderly individuals stated they always skipped meals, 38.1% stated they sometimes skipped meals, and 37.7% stated they never skipped meals. Although the rate of men who did not skip meals (42.9%) was higher than women (35.2%), no statistically significant difference was determined between genders for skipping meals (χ^2=1.519, p>0.05). Seventy-nine point one percent of individuals who skipped meals skipped lunch, 17.2% skipped breakfast, and 3.7% skipped dinner. The rate of women who skipped lunch was 81.9%, while it was 72.5% in men. The reason for skipping meals was stated as 'getting up late in the morning' in 48.5% of individuals, 'do not want-lack of appetite' in 39.6%, 'not accustomed to' in 29.9% (Table 4.6).

Table 4.6. Evaluation of state of appetite and nutritional habits in the study group

	Males (n=70)		Females (n=145)		Total (n=215)		p*
	n	%	n	%	n	%	
State of Appetite							
Good	29	41.4	53	36.6	82	38.2	
Normal	33	47.1	78	53.8	111	51.6	0.65
Poor	8	11.4	14	9.7	22	10.2	
Number of Meals							
2 meals	21	30.0	51	35.2	72	33.5	0.45
3 meals	49	70.0	94	64.8	143	66.5	
Number of Snacks							
0	1	1.4	5	3.4	6	2.8	
1	43	61.4	71	49.0	114	53.0	
2	24	34.3	59	40.7	83	38.6	
3	2	2.9	10	6.9	12	5.6	
Meal Skipping							
Always	14	20.0	38	26.2	52	24.2	
Sometimes	26	37.1	56	38.6	82	38.1	0.46
Never	30	42.9	51	35.2	81	37.7	
Skipped Meal	***n=40***		***n=94***		***n=134***		
Breakfast	10	25.0	13	13.8	23	17.2	
Lunch	29	72.5	77	81.9	106	79.1	
Dinner	1	2.5	4	4.3	5	3.7	
Reason for Meal Skipping**							
I get up early	15	37.5	50	53.2	65	48.5	
I do not want to eat, I have no appetite	17	42.5	36	38.3	53	39.6	
I am not accustomed to	15	37.5	25	26.6	40	29.9	
For weight loss	1	2.5	3	3.2	4	3.0	
I live alone	1	2.5	2	2.1	3	2.2	

** Chi-square test, **Several options have been marked.*

State of appetite, dental health, nutritional habits and BMI values of the study group are presented in Table 4.7 according to age intervals. Four point three percent of individuals between age 65-74, 13.7% of individuals between age 75-84, and 17.9% of individuals above age 85 had a poor appetite. 44.6% of individuals between age 65-74, 38.9% of individuals between age 75-84, and 14.3% of individuals above age 85 had a good appetite. A statistically significant difference was determined between age intervals for the state of appetite (χ^2=12.768, p<0.01). Accordingly, the state of appetite decreased significantly with increasing age.

Seventeen point four percent of study participants between age 65-74, 22.1% of individuals between age 75-84, and 50% of individuals above age 85 had difficulties in chewing-swallowing. A statistically significant difference was determined between age intervals for the difficulties in chewing-swallowing (χ^2=12.861, p<0.01). Accordingly, the rate of individuals with difficulty in chewing-swallowing increased with increasing age. Although the rate of tooth loss was 42.9% in individuals above age 85 and 26.1% of individuals between age 65-74, no statistically significant difference was determined between age intervals for the presence of tooth loss (χ^2=2.869, p>0.05). (Table 4.7).

Upon examining the number of meals and state of skipping meals according to age intervals, the rate of people who had two meals in one day was 40.2%, 27.4%, and 32.1%, respectively, for individuals aged between 65-74, 75-84 and above 85 year. The majority of individuals from each age group had 3 meals in one day. According to the study, no statistically significant difference was determined between age intervals for the number of meals (χ^2=3.490, p>0.05). It was observed that the frequency of skipping meals was high for individuals from each age group in the study. The highest meal skipping rate was 68.5%, and it belonged to individuals aged between 65-74 years old. It was also observed that 64.3% of individuals above age 85 skipped meals. Individuals with highest, not meal-skipping rate were between 75-84 years old (44.2%). According to the study, no statistically significant difference was determined between age intervals for meal skipping (χ^2=3.257, p>0.05). (Table 4.7).

Table 4.7. Evaluation of health problems and nutritional habits according to certain age intervals in the study group

	Age classification						
	65-74 (n=92)		**75-84 (n=95)**		**≥85 (n=28)**		**p***
	n	**%**	**n**	**%**	**n**	**%**	
State of appetite							
Good	41	44.6	37	38.9	4	14.3	
Normal	47	51.1	45	47.4	19	67.9	**0.01****
Poor	4	4.3	13	13.7	5	17.9	
Difficulty in chewing-swallowing							
Yes	16	17.4	21	22.1	14	50.0	**0.00****
No	76	82.6	74	77.9	14	50.0	
Tooth loss							
Yes	24	26.1	29	30.5	12	42.9	0.23
No	68	73.9	66	69.5	16	57.1	
Number of Meal							
2 meals	37	40.2	26	27.4	9	32.1	0.17
3 meals	55	59.8	69	72.6	19	67.9	
Meal skipping							
Yes	63	68.5	53	55.8	18	64.3	0.19
No	29	31.5	42	44.2	10	35.7	

** Chi-square test, **p<0.05*

The amount of water consumption in one day was questioned in the study group according to a number of glasses consumed, it was calculated in ml and presented in Table 4.8. Upon examining daily water consumption in elderly individuals, it was seen that 1.9% consumed less than 500 mL of water, 34.9% consumed between 500-999 mL, 29.3% between 1000-1499 mL, 23.7% between 1500-1999 mL, and 10.2% consumed more than 2000 mL of water. While the majority of men (42.9%) consumed 500-999 mL of water, this rate was lower in women (31%). Mean daily water consumption was 1146.9±472.6 mL in all individuals. A statistically significant difference was determined in the study for mean water consumption level between genders ($p<0.01$). Accordingly, mean daily water consumption level was significantly higher in women (1208.9±502.7 mL) than men (1018.5±375.0 mL).

Table 4.8. Evaluation of water consumption in the study group

Water consumption (mL)	**Males (n=70)**		**Females (n=145)**		**Total (n=215)**		**t**	**p****
	n	**%**	**n**	**%**	**n**	**%**		
0-499	1	1.4	3	2.1	4	1.9		
500-999	30	42.9	45	31.0	75	34.9		
1000-1499	23	32.9	40	27.6	63	29.3		
1500-1999	14	20.0	37	25.5	51	23.7		
2000 and above	2	2.9	20	13.8	22	10.2		
Mean Water Consumption*	1018.5±375.0		1208.9±502.7		1146.9±472.6		-2.812	**0.00*****

**$\bar{X}$±SD, **Student T test, ***p<0.01*

The state of smoking and alcohol intake is presented in Table 4.9. for the study group. Seven point four percent of individuals were still smoking, 33% has smoked before and 59.5% had never smoked. 8.6% of men and 6.9% of women were still smoking. A statistically significant difference was determined between genders for smoking (χ^2=44.867, $p<0.05$). The rate of alcohol consumption was quite low for elderly individuals in the study. Ninety-three percent of elderly individuals did not consume

alcohol, and 5.1% only consumed alcohol in special days. Seven point one percent of men consumed alcohol in only special days, and 4.3% in meals. Four point one percent of women only consumed alcohol in special days, and 95.2% did not use alcohol. Upon examining the frequency of drinking alcohol in all alcohol users, it was determined that 26.7% used alcohol once a week, 53.3% used alcohol twice in a month, and 20% used alcohol twice a year. The frequency of use was higher in men who consumed alcohol compared to women. Sixty-two point five percent of men consumed alcohol twice a month, and 37.5% consumed alcohol once a week. In women, 57.1% consumed alcohol twice a month, while 42.9% of women consumed alcohol twice a year.

Table 4.9. Evaluation of smoking and alcohol consumption status in the study group

	Males (n=70)		**Females (n=145)**		**Total (n=215)**		**p***
	n	**%**	**n**	**%**	**n**	**%**	
Smoking Status							
I still smoke	6	8.6	10	6.9	16	7.4	
I used to smoke, I have quit smoking	44	62.9	27	18.6	71	33.0	**0.00****
I have never smoked	20	28.6	108	74.5	128	59.5	
Alcohol Intake							
No	62	88.6	138	95.2	200	93.0	
Yes, only in important days	5	7.1	6	4.1	11	5.1	
Yes, in meals	3	4.3	1	0.7	4	1.9	
Frequency of Alcohol Use	***n=8***		***n=7***		***n=15***		
Once a week	3	37.5	-	-	4	26.7	
Twice a month	5	62.5	4	57.1	8	53.3	
Twice a year	-	-	3	42.9	3	20.0	

**Chi-square test, **p<0.01*

The study group was questioned about regular physical activity and results are shown in Table 4.10. While 28.4% of elderly individuals practiced regular physical activity, 71.6% did not. While the rate of physical activity was higher in women (30.3%) than men (24.3%), no statistically significant difference was determined between genders for physical activity (χ^2=0.853, p>0.05). Sixty-two point three percent of the elderly individuals practicing physical activity took walks, 24.6% did manual labor and 6.6% did garden work. Ninety-four point one percent of men practicing physical activity took walks, while 50% of women took walks and 34.1% did manual labor. Upon examining the frequency of activity in elderly individuals, 49.2% practiced physical activity every day, 31.1% 3-4 times a week, 9.8% 5-6 times a week, 6.6% once a week and 3.3% practiced physical activity twice a week. The rate of women who practiced physical activity every day (56.8%) is higher compared to men who practiced physical activity every day (29.4%).

Table 4.10. Evaluation of regular physical activity in the study group

	Males (n=70)		**Females (n=145)**		**Total (n=215)**		**p***
	n	**%**	**n**	**%**	**n**	**%**	
Regular Physical Activity							
Yes	17	24.3	44	30.3	61	28.4	0.35
No	53	75.7	101	69.7	154	71.6	
Type of Activity	***n=17***		***n=44***		***n=61***		
Walking	16	94.1	22	50.0	38	62.3	
Manual labor	-	-	15	34.1	15	24.6	
Garden work	1	5.9	3	6.8	4	6.6	
Swimming	-	-	2	4.5	2	3.3	
Arm-leg exercises	-	-	2	4.5	2	3.3	
Frequency of Activity	***n=17***		***n=44***		***n=61***		
Every day	5	29.4	25	56.8	30	49.2	
Once a week	1	5.9	3	6.8	4	6.6	
Twice a week	1	5.9	1	2.3	2	3.3	
3-4 times a week	6	35.3	13	29.5	19	31.1	
5-6 times a week	4	23.5	2	4.5	6	9.8	

** Chi-square test*

Anthropometric measurements were evaluated for the individuals in the study and they are shown in Table 4.11. Minimum and maximum age of the individuals in the study are 65 and 94, respectively, and the mean age of all participants is 76.1±7.0. A statistically significant difference was determined between genders for mean age ($p<0.01$). According to this, mean age was significantly higher in men (78.6±6.8 years) than women (74.9±6.9 years). Mean body weight was higher in men (75.6±13.2 kg) compared to mean body weight of women (68.6±13.0 kg). A statistically significant difference was determined between genders for body weight ($p<0.01$). Mean height was 166.1±7.9 cm in men, while it was 154.1±5.8 cm in women. This height difference between men and women was determined to be statistically significant ($p<0.01$). While mean BMI was 27.4±4.7 kg/m^2 in men, it was 28.8±5.1 kg/m^2 in women. The lowest BMI among all individuals was 16.3 kg/m^2, while the highest BMI was 43.7 kg/m^2. No statistically significant difference was determined between genders for BMI ($p>0.05$).

Mean mid-upper arm circumference was similar between men and women in the study (28.3±4.2 cm and 28.6±3.9 cm, respectively). No statistically significant difference was determined between genders for mid-upper arm circumference ($p>0.05$). Mean calf circumference was 34.8±3.7 cm in men, while it was 34.7±4.1 cm in women. No statistically significant difference was determined between genders for mean calf circumference ($p>0.05$). Mean waist circumference was 101.8±13.6 cm in men, and it was 100.1±12.4 cm in women. No significant difference was determined for mean waist circumference between genders ($p>0.05$). Mean hip circumference was higher in women (100.1±12.4 cm) than men (99.9±7.9 cm). A statistically significant difference was determined between genders for hip circumference ($p<0.01$). Upon examining the waist/hip ratio, it was observed that the mean waist/hip ratio was higher in men (1.0±0.11) compared to women (0.9±0.1). A statistically significant difference was determined between genders for waist/hip ratio ($p<0.01$) (Table 4.11.).

Table 4.11. Evaluation of age and anthropometric measurements according to gender in the study group

	Males (n=70)			Females (n=145)			Total (n=215)				
	Minimum	**Maximum**	**$\bar{X}$±SD**	**Minimum**	**Maximum**	**$\bar{X}$±SD**	**Minimum**	**Maximum**	**$\bar{X}$±SD**	**t**	**p***
Age (years)	66	94	**78.6 ± 6.8**	65	94	**74.9 ± 6.9**	65	94	76.1 ± 7.0	0.958	**0.00****
Weight (kg)	46.5	110.0	**75.6 ± 13.2**	36.0	110.0	**68.6 ± 13.0**	36.0	110.0	70.9 ± 13.4	3.610	**0.00****
Height (cm)	148.0	189.0	**166.1 ± 7.9**	140.0	168.0	**154.1 ± 5.8**	140.0	189.0	158.0 ± 8.6	11.184	**0.00****
BMI (kg/m^2)	16.3	38.1	**27.4 ± 4.7**	16.9	43.7	**28.8 ± 5.1**	16.3	43.7	28.4 ± 5.0	-1.902	0.05
MUAC (cm)	20.0	38.0	**28.3 ± 4.2**	18.0	47.0	**28.6 ± 3.9**	18.0	47.0	28.5 ± 4.0	-0.525	0.60
Calf circumference (cm)	25	48	**34.8 ± 3.7**	25	50	**34.7 ± 4.1**	25.0	50.0	34.7 ± 4.0	0.335	0.73
Waist circumference (cm)	71	130	**101.8 ± 13.6**	69	149	**100.1 ± 12.4**	69	149	100.7 ± 12.8	0.905	0.36
Hip circumference (cm)	80	124	**99.9 ± 7.9**	82	137	**104.8 ± 10.6**	80	137	103.3 ± 10.1	-3.781	**0.00****
Waist/hip ratio	0.76	1.39	**1.0 ± 0.11**	0.7	1.26	**0.9 ± 0.1**	0.76	1.39	0.97 ± 0.1	4.170	**0.00****

** Student t test, **p<0.01*

According to some anthropometric measurements of the study group, evaluation of body weight and disease risk level is presented in Table 4.12. According to the classification determined by WHO, 2.3% of all individuals were underweight, 23.7% was normal, 40% was overweight, and 34% was obese. It was observed that the majority of men and women were overweight (48.6% and 35.9%, respectively). No statistically significant difference was determined in the study between genders for BMI classification (χ^2=5.970, p>0.05). According to the other BMI classification, 55.7% of men and 63.4% of women was overweight, and no statistically significant difference was determined between BMI categories according to genders (χ^2=1.638, p>0.05). According to waist circumference, it was seen that the majority of males and females was in the high-risk group (54.3 and 83.4%, respectively) with regard to metabolic diseases. As per waist-to-hip ratio, 97.9% of women and 57.1% of men had abdominal obesity. Calf circumference was lower than 31 cm in 8.6% of men and 13.8% of women, and no statistically significant difference was determined between genders (χ^2=1.211, p>0.05). In this study, mid-upper arm circumference of 7.1% of men and 4.9% of women were below 22 cm.

Table 4.12. Evaluation of some anthropometric measurements in the study according to the reference values

Anthropometric measurements			Males (n=70)		Females (n=145)		Total (n=215)		p*
			n	%	n	%	n	%	
BMI (kg/m^2) (WHO)									
Underweight	<18.5		2	2.9	3	2.1	5	2.3	0.11
Normal	18.5 - 24.9		18	25.7	33	22.8	51	23.7	
Overweight	25.0 - 29.9		34	48.6	52	35.9	86	40.0	
Obese	≥ 30.0		16	22.9	57	39.3	73	34.0	
BMI (kg/m^2)									
Underweight	<22		9	12.9	12	8.3	21	9.8	0.44
Normal	22 - 27		22	31.4	41	28.3	63	29.3	
Overweight	>27		39	55.7	92	63.4	131	60.9	
Waist circumference (cm)									
	Male	**Female**							
Normal	<94	<80	19	27.1	6	4.1	-	-	
Risk	≥94	≥80	13	18.6	18	12.4	-	-	
High-risk	≥102	≥88	32	54.3	121	83.4	-	-	
Waist/hip ratio									
	Male	**Female**							
Normal	<1.0	<0.80	30	42.9	3	2.1	-	-	
Abdominal obesity	≥1.0	≥0.80	40	57.1	142	97.9	-	-	
Calf circumference (cm)									
<31			6	8.6	20	13.8	26	12.1	0.27
≥31			64	91.4	125	86.2	189	87.9	
MUAC (cm)									
<21			1	1.4	3	2.1	4	1.9	
21-22			4	5.7	4	2.8	8	3.7	
>22			65	92.9	138	95.2	203	94.4	

**Chi-square test*

Anthropometric measurements of the study group were evaluated according to certain age intervals and demonstrated in Table 4.13. Upon reviewing as per BMI values determined by WHO, it was observed that 34.8% of individuals aged between 65-74 years old were obese, 33.7% was overweight and 1.1 was underweight; 44.2% of individuals aged between 75-84 years old were overweight, 36.8% was obese and 2.1% was underweight; and 46.4% of individuals aged 85 years old and above were overweight, 21.4% was obese and 7.1% was underweight. Upon examining another BMI classification method, it was observed that 12% of individuals between ages 65-74, 5.3% of individuals between ages 75-84, and 17.9 of individuals aged 85 and above had BMI values below 22. The highest rate of individuals with BMI values above 27 was between ages 75-84 with 68.4%. According to the study, no statistically significant difference was determined between age intervals for BMI values (χ^2=7.031, p>0.05). It was observed that men with waist/hip ratio above 1.0 were mostly between ages 75-84 after examining the waist/hip ratio of men according to age intervals. The rate of women with waist/hip ratio above 0.8 was high in every age interval. The calf circumference of 8.7% of individuals between ages 65-74, 9.5% of individuals between ages 75-84, and 32.1% of individuals aged 85 and above was lower than 31cm. Calf circumference decreased with increasing age intervals, and a statistically significant difference was determined between them (χ^2=12.200, p<0.05). Mid-upper arm circumference was below 23 cm in 21.5% of individuals aged 85 and above, 5.3% of individuals between ages 75-84, and 1.1% of individuals between ages 65-74.

Table 4.13. Evaluation of anthropometric measurements according to age intervals in the study group

Anthropometric measurements		Age classification						p*
		65-74 (n=92)		75-84 (n=95)		≥85 (n=28)		
		n	%	n	%	n	%	
BMI (kg/m^2) (WHO)								
Underweight	<18.5	1	1.1	2	2.1	2	7.1	
Normal	18.5 - 24.9	28	30.4	16	16.8	7	25.0	
Overweight	25.0 - 29.9	31	33.7	42	44.2	13	46.4	
Obese	≥ 30.0	32	34.8	35	36.8	6	21.4	
BMI (kg/m^2)								
Underweight	<22	11	12.0	5	5.3	5	17.9	
Normal	22 - 27	28	30.4	25	26.3	10	35.7	0.13
Overweight	>27	53	57.6	65	68.4	13	46.4	
Waist/hip ratio								
Male	<1.0	62	67.4	49	51.6	16	57.1	
	≥1.0	30	32.6	46	48.4	12	42.9	
Female	<0.80	2	2.2	2	2.1	1	3.6	
	≥0.80	90	97.8	93	97.9	27	96.4	
Calf circumference (cm)								
<31		8	8.7	9	9.5	9	32.1	**0.00****
≥31		84	91.3	86	90.5	19	67.9	
MUAC (cm)								
<21		1	1.1	2	2.1	1	3.6	
21-22		-	-	3	3.2	5	17.9	
>22		91	98.9	90	94.7	22	78.6	

** Chi-square test, **p<0.05*

The classification of elderly participants of the study according to their MNA results is presented in Table 4.14. It was observed that 72.1% of individuals had normal nutritional status, 24.7% had malnutrition risk and 3.3% had malnutrition. While malnutrition risk was 23.4% in women and 27.1% in men, the malnutrition rate was 1.4% in men and 4.1% in women.

Table 4.14. Nutritional status in the study group according to gender

	Male		**Female**		**Total**	
MNA score	**n**	**%**	**n**	**%**	**n**	**%**
24-30	50	71.4	105	72.4	155	72.1
17-23.5	19	27.1	34	23.4	53	24.7
<17	1	1.4	6	4.1	7	3.3
Total	70	100.0	145	100.0	215	100.0

Socio-demographic characteristics of the study group were examined according to their nutritional status, and presented in Table 4.15. The number of individuals with normal nutritional status was 155 according to MNA screening tool, and a total number of individuals with malnutrition risk and malnutrition was 60. 67.7% of individuals with normal nutritional status and 66.7% of individuals with malnutrition risk or malnutrition were women. No statistically significant difference was determined in the study between genders for nutritional status (χ^2=0.023, p>0.05). 40% of individuals with malnutrition risk or malnutrition was aged between 75-84, 36.7% was aged between 65-74 years old, and 23.3% was aged 85 and above. 45.2% of individuals in the other group was aged between 65-74 years old, and 45.8% was aged between 75-84 years old. A statistically significant difference was determined in the study between age intervals for nutritional status (χ^2=7.852, p<0.05) (Table 4.15).

Fourty percent of individuals with malnutrition risk or malnutrition was married, and 60% was single. While 59.4% of individuals with normal nutritional status was married, 40.6% was single. A statistically significant difference was determined in the study between groups with different marital status according to nutritional status

(χ^2=6.522, p<0.05). Accordingly, malnutrition risk was significantly higher in single elderly individuals compared to married elderly individuals. Upon examining the educational status of individuals, 52.3% of individuals with normal nutritional status were primary/secondary school graduates, while 35.5% have graduated from high school and above. Moreover, 58.3% of individuals with malnutrition risk or malnutrition were primary/secondary school graduates, while 30% have graduated from high school and above. No statistically significant difference was determined between groups with different educational status according to nutritional status (χ^2=0.692, p>0.05). 15% of individuals with malnutrition risk or malnutrition and 15.5% of the other group lived alone. No statistically significant difference was determined between the presence or absence of cohabitants according to nutritional status (χ^2=0.008, p<0.05) (Table 4.15.).

Table 4.15. Evaluation of socio-demographic characteristics according to nutritional status in the study group

Variables	Nutritional Status				p*
	Normal nutritional status (n=155)		Risk of malnutrition / Malnutrition (n=60)		
	n	%	n	%	
Gender					
Male	50	32.3	20	33.3	0.88
Female	105	67.7	40	66.7	
Age Classification					
65-74	70	45.2	22	36.7	**0.02****
75-84	71	45.8	24	40.0	
≥85	14	9.0	14	23.3	
Marital status					
Married	92	59.4	24	40.0	**0.01****
Single	63	40.6	36	60.0	
Educational status					
Literate and below	19	12.3	7	11.7	0.70
Primary/secondary school	81	52.3	35	58.3	
High school and above	55	35.5	18	30.0	
Cohabitants					
With people	131	84.5	51	85.0	0.93
Alone	24	15.5	9	15.0	

** Chi-square test, **p<0.05*

Current diseases of the individuals in the study were reviewed according to MNA classification and shown in Table 4.16. It was observed that the most common diseases observed in patients with malnutrition risk were hypertension (60.4%), muscle disease (58.5%), cardiovascular disease (47.2%), diabetes (45.3%), gastrointestinal disease (35.8%), and renal disease (26.4%), respectively. Meanwhile, the most common diseases in patients with malnutrition were cardiovascular disease (71.4%), muscle disease (57.1%), hypertension (57.1%) and gastrointestinal disease (57.1%).

Table 4.16. Distribution of current diseases in the study group according to MNA classification

	Malnutrition classification							
	Normal nutritional status (n=155)		At risk of malnutrition (n=53)		Malnutrition (n=7)		Total (n=215)	
Diseases*	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Hypertension	116	74.8	32	60.4	4	57.1	152	70.7
Muscle disease	82	52.9	31	58.5	4	57.1	117	54.4
Cardiovascular disease	64	41.3	25	47.2	5	71.4	94	43.7
Diabetes	65	41.9	24	45.3	2	28.6	91	42.3
Other**	54	34.8	17	32.1	1	14.3	72	33.5
Falling, fractures, cracks	56	36.1	12	22.6	3	42.9	71	33.0
Gastrointestinal disease	41	26.5	19	35.8	4	57.1	64	29.8
Hyperlipidemia	41	26.5	9	17.0	2	28.6	52	24.2
Renal disease	26	16.8	14	26.4	-	-	40	18.6
Respiratory disease	22	14.2	12	22.6	3	42.9	37	17.2
Iron deficiency anemia	25	16.1	9	17.0	3	42.9	37	17.2
Rheumatic disease	22	14.2	6	11.3	1	14.3	29	13.5
Depression	15	9.7	9	17.0	3	42.9	27	12.6
Cancer	7	4.5	5	9.4	1	14.3	13	6.0

** Several options have been marked. **Other current diseases have been determined as allergy (n=3), eye conditions (n=11), neurological disease (n=24), prostate (n=2), thyroid disease (n=31) and sleep apnea syndrome (n=1).*

Some health problems and nutritional habits of the study group were evaluated according to their nutritional status, and these are demonstrated in Table 4.17. Upon checking the number of drugs used by elderly individuals according to their nutritional status, it was observed that individuals with malnutrition risk or malnutrition used an average of 5.6±3.4 drugs daily, and 56.7% used more than 5 drugs. Whereas individuals with normal nutritional status used an average of 6.3±3.1 drugs daily, and 51% used more than 5 drugs. No statistically significant difference was determined between classes of daily drug number for the nutritional status of individuals (χ^2=0.563, p>0.05). A statistically significant difference was determined in hypertension and depression diagnosis upon examining the current diseases of individuals. While the prevalence of hypertension was 74.8% in individuals with normal nutrition, it was 60% in individuals with risk/malnutrition. This difference was determined to be statistically significant (χ^2=5.598, p<0.05). Diagnosis of depression was observed in 9.7% of individuals with normal nutritional status and 20% of individuals with malnutrition risk or malnutrition. This difference between nutritional state and presence of depression was determined to be statistically significant (χ^2=4.197, p<0.05) (Table 4.17).

Thirty one point seven percent of elderly individuals in the study and 1.9% of individuals with normal nutritional status expressed they had a poor appetite. A statistically significant difference was determined in the study between states of appetite according to nutritional status (χ^2=55.370, p<0.05). Accordingly, the state of appetite is significantly lower in individuals with malnutrition risk/malnutrition. Forty six point seven percent of individuals with malnutrition risk or malnutrition had difficulties in chewing-swallowing while eating, and 45% had tooth loss. Whereas 14.8% of individuals with normal nutritional status had difficulties in chewing-swallowing, and 24.5% had tooth loss. A statistically significant difference was determined in the study between the presence and absence of chewing-swallowing difficulties according to nutritional status (χ^2=24.217, p<0.05). Similarly, a statistically significant difference was determined between the presence and absence of tooth loss according to nutritional status (χ^2=8.605, p<0.05). Accordingly, individuals with malnutrition risk or malnutrition had significantly higher chewing-swallowing difficulties and tooth loss. Upon examining the nutritional status of these individuals, 38.3% of individuals with malnutrition risk or malnutrition had 2 meals, and 61.7% had 3 meals, while 75% expressed they often skipped meals. It was also observed that 31.6% of individuals with normal nutritional status had 2 meals and 68.4% had 3 meals, while 57.4% often skipped meals. No statistically significant

difference was determined in the study between the number of meals according to nutritional status (χ^2=0.877, p>0.05), however, there was a statistically significant difference according to meal-skipping status (χ^2=5.694, p<0.05). Accordingly, the meal-skipping status of individuals with malnutrition risk or malnutrition was significantly higher compared to individuals with normal nutritional status. Upon whether or not individuals practiced physical activities, the rate of physical activity in individuals with normal nutrition (32.9%) was higher compared to the other group (16.7%). A statistically significant difference was determined between individuals who practiced or did not practice physical activity according to nutritional status (χ^2=5.611, p<0.05).

Table 4.17. Evaluation of health problems, nutritional and physical activity habits of the study group according to nutritional status

	Nutritional Status				p**
	Normal nutritional status (n=155)		At risk of malnutrition / Malnutrition (n=60)		
	n	%	n	%	
State of appetite					
Good	76	49.0	6	10.0	**0.00*** **
Poor	3	1.9	19	31.7	
Normal	76	49.0	35	58.3	
The number of drugs					
≤5	76	49.0	26	43.3	0.45
>5	79	51.0	34	56.7	
Mean number of drugs*	5.6 ± 3.4		6.3 ± 3.1		
Difficulty in chewing-swallowing					
Yes	23	14.8	28	46.7	**0.00*** **
No	132	85.2	32	53.3	
Tooth loss					
Yes	38	24.5	27	45.0	**0.00*** **
No	117	75.5	33	55.0	
Hypertension diagnosis					
Yes	116	74.8	36	60.0	**0.03*** **
No	39	25.2	24	40.0	
Depression diagnosis					
Yes	15	9.7	12	20.0	**0.04*** **
No	140	90.3	48	80.0	
Number of meals					
2 meals	49	31.6	23	38.3	0.34
3 meals	106	68.4	37	61.7	
Meal skipping					
Yes	89	57.4	45	75.0	**0.00*** **
No	66	42.6	15	25.0	
Regular physical activity					
Yes	51	32.9	10	16.7	**0.01*** **
No	104	67.1	50	83.3	

**$\bar{X}$±SD , ** Chi-square test, ***p<0.05*

Individuals participating in the study have been classified according to their MNA results and evaluated according to two different BMI classification methods (Table 4.18). While 57.1% of individuals with malnutrition was underweight according to BMI classification (determined by WHO), 85.7% was thin according to the other classification. According to BMI (classification determined by WHO), 37.7% of individuals with malnutrition was normal, 35.8% was overweight, and 22.6% had obesity class I. According to other BMI classification, 22.6% was underweight, 39.6% was normal, and 37.7% was overweight. Upon examining BMI (determined by WHO) levels of individuals with normal nutritional status, it was observed that 43.2% was overweight, 27.1% had obesity class I, and 18.7% was normal. Among these individuals, 71% was overweight, 27.1% was normal and 1.9% was underweight according to other BMI classification.

Tablo 4.18. Distribution of MNA classification and BMI values

	Malnutrition classification							
	Normal nutritional status (n=155)		**At risk of malnutrition (n=53)**		**Malnutrition (n=7)**		**Total (n=215)**	
BMI (kg/m^2) (WHO)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
<18.5	-	-	1	1.9	4	57.1	5	2.3
18.5-24.9	29	18.7	20	37.7	2	28.6	51	23.7
25.0-29.9	67	43.2	19	35.8	-	-	86	40.0
30.0-34.9	42	27.1	12	22.6	1	14.3	55	25.6
35.0-39.9	15	9.7	1	1.9	-	-	16	7.4
≥40.0	2	1.3	-	-	-	-	2	0.9
BMI (kg/m^2)								
<22	3	1.9	12	22.6	6	85.7	21	9.8
22-27	42	27.1	21	39.6	-	-	63	29.3
>27	110	71.0	20	37.7	1	14.3	131	60.9

Age and anthropometric measurements of the study group were evaluated according to their nutritional status, and these are demonstrated in Table 4.19. Mean age for individuals with malnutrition risk or malnutrition (77.8±8.1) was higher compared to individuals with normal nutritional status (75.5±6.5). This difference was determined to be statistically significant ($p<0.05$). Individuals were divided into two groups according to their nutritional status and compared according to BMI classification determined by WHO. Forty three point two percent of individuals with normal nutritional status had BMI levels between 25.0-29.9 kg/m^2, putting them in the overweight category. Thirty-eight point one percent of these individuals had ≥30.0 kg/m^2 BMI and therefore placed in the obesity category. Since 8.3% of individuals with malnutrition risk or malnutrition had BMI levels below 18.5 kg/m^2, they were assessed to be thin. Thirty-six point seven percent of these individuals were normal, 31.7% was overweight, and 23.3% was in the obesity category. A statistically significant difference was determined in the study between groups with BMI levels (WHO) according to nutritional status ($\chi^2=25.244$, $p<0.05$). According to another BMI classification, 30% of individuals with malnutrition risk or malnutrition and 1.9% of individuals with normal nutritional status had <22 kg/m^2 BMI levels. A statistically significant difference was determined between BMI levels according to nutritional status ($\chi^2=44.986$, $p<0.05$). Accordingly, the rate of <22 kg/m^2 BMI score in individuals with malnutrition risk or malnutrition was significantly higher compared to individuals with normal nutritional status.

For individuals with malnutrition risk or malnutrition, mean body weight was 62.5±13.3 kg, BMI 25.4±5.0 kg/m^2, MUAC 26.2±4.0 cm, calf circumference 33.1±4.1 cm, waist circumference 94.6±14.2 cm, calf circumference 98.8±9.9 cm, and waist-to-hip ratio was 0.96±0.1. While mean waist to hip ratio of individuals with normal nutrition was similar with the other group, mean body weight, BMI, MUAC, calf circumference, waist circumference, and hip circumference were higher. A statistically significant difference was determined in the study between nutritional status and mean body weight, BMI, MUAC, calf circumference, waist circumference, hip circumference ($p<0.05$).

Table 4.19. Evaluation of anthropometric measurements in the study group according to nutritional status

	Nutritional status				t	p
	Normal Nutritional Status		Malnutrition risk / malnutrition			
	n	%	n	%		
BMI kg/m^2 (WHO)						
<18.5	-	-	5	8.3		
18.5-24.9	29	18.7	22	36.7		[1]**0.00***
25.0-29.9	67	43.2	19	31.7		
≥ 30.0	59	38.1	14	23.3		
BMI kg/m^2						
<22	3	1.9	18	30.0		
22-27	42	27.1	21	35.0		[1]**0.00***
>27	110	71.0	21	35.0		
	n	$\bar{X}$± SD	n	$\bar{X}$± SD		
Age (years)	155	75.5 ± 6.5	60	77.8 ± 8.1	-1.99	[2]**0,04***
Weight (kg)	155	74.1 ± 12.0	60	62.5 ± 13.3	6.136	[2]**0.00***
BMI (kg/^{2})	155	29.5 ± 4.5	60	25.4 ± 5.0	5.789	[2]**0.00***
MUAC (cm)	155	29.4 ± 3.6	60	26.2 ± 4.0	5.663	[2]**0.00***
Calf circumference (cm)	155	35.4 ± 3.8	60	33.1 ± 4.1	3.842	[2]**0.00***
Waist circumference (cm)	155	103.0 ± 11.4	60	94.6 ± 14.2	4.096	[2]**0.00***
Hip circumference (cm)	155	105.0 ± 9.6	60	98.8 ± 9.9	4.170	[2]**0.00***
Waist/hip ratio	155	0.98 ± 0.09	60	0.96 ± 0.1	1.526	[2]0.12

[1]Chi-square test, [2]Student T test, *p<0.05

Mean daily macronutrient intake levels and mean water consumption were evaluated and demonstrated in Table 4.20. According to the nutritional status of the study group. Individuals with malnutrition risk or malnutrition consumed 1534.5±228 kcal energy, 168.5±32.5 g carbohydrates, 60.8±16.2 g protein, 66.9±14.0 g fat and 19.1±5.5 g

fiber in one day, and drank 1045.0±452.2 mL of water. While individuals with normal nutritional status mean protein intake was similar to the other group, mean energy, carbohydrates, fat, fiber, and water consumption were higher. A statistically significant difference was determined in the study between nutritional status and daily mean energy, carbohydrate, fat, fiber and water consumption ($p<0.05$).

Table 4.20. The relation between nutritional status and age, macronutrient intake and water consumption in the study group

	Nutritional status				**t**	**p***
	Normal Nutritional Status		**Malnutrition risk / malnutrition**			
	n	**$\bar{X}$± SD**	**n**	**$\bar{X}$± SD**		
Energy (kcal)	155	1768.5±237.7	60	1534.5±228.0	6.550	**<0.01****
Carbohydrate (g)	155	199.3 ± 37.5	60	168.5 ± 32.5	5.598	**<0.01****
Protein (g)	155	64.5 ± 14.9	60	60.8 ± 16.2	1.604	0.11
Fat (g)	155	77.0 ± 15.0	60	66.9 ± 14.0	4.460	**<0.01****
Fibre (g)	155	23.6 ± 7.1	60	19.1 ± 5.5	4.966	**<0.01****
Water consumption (mL)	155	1186.4±475.9	60	1045.0±452.2	1.982	**0.04****

** Student t test, **p<0.05*

The frequency of food consumption was investigated in order to evaluate whether the elderly individuals in the study had a balanced diet. Accordingly, food consumption in the last month was evaluated under the consumption frequencies of every day, 3-5 times a week, 1-2 times a week, 1-2 times a month, and presented in Table 4.21.

Upon examining the consumption frequency of milk and dairy products in elderly individuals, it was observed that 21.9% of all individuals consumed milk 3-5 times a week (18.6% of men, 23.4% of women), and 35.3% never consumed milk (37.1% of men, 34.5% of women). Majority of patients in both groups (52.9% of men, 55.9% of women) consumed yogurt 3-5 times a week, while 19.5% of all patients consumed yogurt every

day. 79.1% of all patients (72.9% of men, 82.1% of women) consumed cheese every day, and 29.3% (35.7% of men, 26.2% of women) never consumed milky desserts (Table 4.21).

Upon checking consumption frequency of meat and meat-group foods in all individuals, it was observed that the most preferred frequency for eggs was 3-5 times a week in all individuals, and this egg consumption frequency was higher in men (64.3% in men, 55.9% in women). The most preferred frequency for red meat was 1-2 times a week for both groups, and individuals who consumed red meat in this frequency was observed to be higher in men (68.3% in men, 54.3% in women). It was observed that the most preferred frequency for white meat consumption was 1-2 times a week like red meat (60% in men, 66.2% in women). Fifty point seven percent of all individuals (47.1% of men, 52.4% of women) consumed fish 1-2 times in a month. While 51.6% of all individuals consumed legumes 1-2 times a month, 47% consumed legumes 1-2 times a week. Thirty point two percent of all individuals consumed oilseeds 1-2 times a week, while 20% consumed those 1-2 times a month. This rate of consumption frequency was observed to be higher in men (Table 4.21).

Upon checking consumption frequency of vegetables and fruits, it was observed that individuals who consumed leaf vegetables (greens) 3-5 times a week were higher in women than men (41.4% and 31.4%, respectively). It was observed that the most preferred frequency for other vegetables was every day in all individuals (51.6%), and this consumption frequency was higher in women than men (53.1% and 48.6%, respectively). Sixty percent of all individuals consumed fruits 3-5 times in a week, and 37.2% consumed fruits every day. The rate of women who consumed fruits every day (40.7%) was higher compared to men (30%). While 67.1% of men consumed fruits 3-5 times a week, 56.6% of women did the same. 79.5% of all individuals never consumed dried fruits, and the rate of women and men was similar in this category (Table 4.21).

Upon examining data related to the consumption of grains and grain products for the patients in the study, it was observed that 57.7% of all patients consumed white bread every day, while 33% ate bran bread every day. The most preferred consumption frequency for bulgur and pasta was 1-2 times a month for all individuals (54.4% and 48.4%, respectively). Although the rate of men and women who consumed rice was very close, 54.4% of all patients consumed rice 1-2 times a week. Sixty-three point three percent of all elderly individuals consumed baked-filled pastries (borek) 1-2 times a month, and 35.8% never consumed them. Although the rate of men and women who

consumed cookies and biscuits were very close, 41.9% of all patients consumed those 1-2 times a week (Table 4.21).

Upon examining oil and sugar consumption frequency for all patients included in the study, it was seen that 59.1% of all individuals consumed olives every day, and 45.6% consumed olive oil 3-5 times in a week. The rate of men and women who consumed sunflower seed oil was close, and 76.3% of all patients consumed sunflower seed oil every day. While 43.7% of all patients never consumed butter, 18.6% consumed butter every day. While 24.2% of individuals consume margarine 1-2 times a week, 14.4% consume margarine 3-5 times a week, 37.2% do not consume at all. While 50.2% of all patients (51.4% of men, 49.7% of women) consumed sugar every day, 15.3% (17.1% of men, 14.5% of women) never consumed sugar. The most preferred frequency for the consumption of honey, jam, and molasses was 3-5 times a week and included 58.6% of men and 57.2%. The rate of women who never consumed pastries (57.2%) was higher than men (48.6%) (Table 4.21).

Upon evaluating the consumption frequency of drinks for the patients in the study, it was observed that 77.2% of all patients never consumed packaged juice, and 59.5% never consumed acidic beverages. The rate of women who did not consume soda (62.8%) was higher than men (52.9%). The highest consumption frequency preferred for tea consumption was every day, and it was 3-5 times a week for the consumption of coffee. 88.6% of men and 91% of women drank tea every day (Table 4.21).

Table 4.21. Food consumption frequency according to gender in the study group

	Every day						3-5 times a week						1-2 times a week						1-2 times a month						Never					
	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total	
Food	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Dairy and dairy products																														
Milk	-	-	3	2.1	**3**	**1.4**	13	18.6	34	23.4	**47**	**21.9**	18	25.7	37	25.5	**55**	**25.6**	13	18.6	21	14.5	**34**	**15.8**	26	37.1	50	34.5	**76**	**35.3**
Kefir	-	-	-	-	**-**	**-**	-	-	3	2.1	**3**	**1.4**	3	4.3	4	2.8	**7**	**3.3**	3	4.3	7	4.8	**10**	**4.7**	64	91.4	131	90.3	**195**	**90.7**
Buttermilk	-	-	-	-	-	**-**	1	1.4	12	8.3	**13**	**6.0**	39	55.7	59	40.7	**98**	**45.6**	23	32.9	56	38.6	**79**	**36.7**	7	10.0	18	12.4	**25**	**11.6**
Yoghurt	16	22.9	26	17.9	**42**	**19.5**	37	52.9	81	55.9	**118**	**54.9**	13	18.6	31	21.4	**44**	**20.5**	2	2.9	4	2.8	**6**	**2.8**	2	2.9	3	2.1	**5**	**2.3**
Cheese	51	72.9	119	82.1	**170**	**79.1**	16	22.9	22	15.2	**38**	**17.7**	2	2.9	3	2.1	**5**	**2.3**	-	-	-	-	**-**	**-**	1	1.4	1	0.7	**2**	**0.9**
Kashar cheese	5	7.1	6	4.1	**11**	**5.1**	25	35.7	52	35.9	**77**	**35.8**	29	41.4	51	35.2	**80**	**37.2**	2	2.9	9	6.2	**11**	**5.1**	9	12.9	27	18.6	**36**	**16.7**
Milky desserts	-	-	-	-	-	-	-	-	-	-	-	-	1	1.4	5	3.4	**6**	**2.8**	44	62.9	102	70.3	**146**	**67.9**	25	35.7	38	26.2	**63**	**29.3**
Meat, eggs, legumes																														
Eggs	8	11.4	22	15.2	**30**	**14.0**	45	64.3	81	55.9	**126**	**58.6**	15	21.4	38	26.2	**53**	**24.7**	1	1.4	1	0.7	**2**	**0.9**	1	1.4	3	2.1	**4**	**1.9**
Red meat	-	-	-	-	-	-	12	17.1	24	16.6	**36**	**16.7**	38	54.3	99	68.3	**137**	**63.7**	20	28.6	22	15.2	**42**	**19.5**	-	-	-	-	-	-
Chicken meat	-	-	-	-	-	-	15	21.4	20	13.8	**35**	**16.3**	42	60.0	96	66.2	**138**	**64.2**	13	18.6	24	16.6	**37**	**17.2**	-	-	5	3.4	**5**	**2.3**
Fish	-	-	-	-	-	-	-	-	-	-	-	-	4	5.7	5	3.4	**9**	**4.2**	33	47.1	76	52.4	**109**	**50.7**	33	47.1	64	44.1	**97**	**45.1**
Legumes	-	-	-	-	-	-	-	-	3	2.1	**3**	**1.4**	35	50.0	66	45.5	**101**	**47.0**	35	50.0	76	52.4	**111**	**51.6**	-	-	-	-	-	-
Oilseeds	2	2.9	11	7.6	**13**	**6.0**	15	21.4	31	21.4	**46**	**21.4**	24	34.3	41	28.3	**65**	**30.2**	19	27.1	29	20.0	**48**	**20.0**	10	14.3	33	22.8	**43**	**20.0**
Vegetables-Fruits																														
Leaf vegetables	2	2.9	1	0.7	**3**	**1.4**	22	31.4	60	41.4	**82**	**38.1**	43	61.4	79	54.5	**122**	**56.7**	3	4.3	5	3.4	**8**	**3.7**	-	-	-	-	-	-
Other vegetables	34	48.6	77	53.1	**111**	**51.6**	34	48.6	64	44.1	**98**	**45.6**	2	2.9	4	2.8	**6**	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-
Fruits	21	30.0	59	40.7	**80**	**37.2**	47	67.1	82	56.6	**129**	**60.0**	2	2.0	3	2.1	**5**	**2.3**	-	-	1	0.7	**1**	**0.5**	-	-	-	-	-	-
Dried fruits	7	10.0	10	6.9	**-**	**-**	2	2.9	6	4.1	**8**	**3.7**	7	10.0	10	6.9	**17**	**7.9**	4	5.7	15	10.3	**19**	**8.8**	57	81.4	114	78.6	**171**	**79.5**
Bread-Grains																														
White bread	43	61.4	81	55.9	**124**	**57.7**	7	10.0	13	9.0	**20**	**9.3**	5	7.1	9	6.2	**14**	**6.5**	12	17.1	29	20.0	**41**	**19.1**	3	4.3	13	9.0	**16**	**7.4**
Bran bread	21	30.0	50	34.5	**71**	**33.0**	6	8.6	13	9.0	**19**	**8.8**	3	4.3	7	4.8	**10**	**4.7**	9	12.9	12	8.3	**21**	**9.8**	31	44.3	63	43.4	**94**	**43.7**

Table 4.21 (continued): Food consumption frequency according to gender in the study group

	Everyday						3-5 times a week						1-2 times a week						1-2 times a month						Never					
	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total	
Food	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Bulgur	-	-	-	-	-	-	-	-	2	1.4	**2**	**0.9**	34	48.6	56	38.6	**90**	**41.9**	36	51.4	56	38.6	**117**	**54.4**	-	-	6	4.1	**6**	**2.8**
Pasta	-	-	-	-	-	-	-	-	3	2.1	**3**	**1.4**	35	50.0	61	42.1	**96**	**44.7**	34	48.6	70	48.3	**104**	**48.4**	1	1.4	11	7.6	**12**	**5.6**
Rice	-	-	-	-	-	-	1	1.4	2	1.4	**3**	**1.4**	38	54.3	79	54.5	**117**	**54.4**	30	42.9	60	41.4	**90**	**41.9**	1	1.4	4	2.8	**5**	**2.3**
Borek	-	-	-	-	-	-	-	-	-	-	**-**	**-**	-	-	2	1.4	**2**	**0.9**	45	64.3	91	62.8	**136**	**63.3**	25	35.7	52	35.9	**77**	**35.8**
Cookies, biscuits	-	-	-	-	-	-	5	7.1	18	12.4	**23**	**10.7**	20	28.6	51	35.2	**71**	**33.0**	57	39.3	57	39.3	**90**	**41.9**	12	17.1	19	13.1	**31**	**14.4**
Oil, sugar, dessert																														
Olive	42	60.0	85	58.6	**127**	**59.1**	25	35.7	42	29.0	**67**	**31.2**	2	2.9	7	4.8	**9**	**4.2**	-	-	1	0.7	**1**	**0.5**	1	1.4	10	6.9	**11**	**5.1**
Olive oil	8	11.4	20	13.8	**28**	**13.0**	32	45.7	66	45.5	**98**	**45.6**	25	35.7	47	32.4	**72**	**33.5**	2	2.9	8	5.5	**10**	**4.7**	3	4.3	4	2.8	**7**	**3.3**
Sunflower seed, corn oil	52	74.3	112	77.2	**164**	**76.3**	11	15.7	16	11.0	**27**	**12.6**	5	7.1	15	10.3	**20**	**9.3**	2	2.9	2	1.5	**4**	**1.9**	-	-	-	-	-	-
Butter	12	17.1	28	19.3	**40**	**18.6**	9	12.9	27	18.6	**36**	**16.7**	14	20.0	19	13.1	**33**	**15.3**	4	5.7	8	5.5	**12**	**5.6**	31	44.3	63	43.4	**94**	**43.7**
Margarine	6	8.6	13	9.0	**19**	**8.8**	10	14.3	21	14.5	**31**	**14.4**	17	24.3	35	24.1	**52**	**24.2**	11	15.7	22	15.2	**33**	**15.3**	26	37.1	54	37.2	**80**	**37.2**
Sugar	36	51.4	72	49.7	**108**	**50.2**	7	10.0	22	15.2	**29**	**13.5**	8	11.4	13	9.0	**21**	**9.8**	7	10.0	17	11.7	**24**	**11.2**	12	17.1	21	14.5	**33**	**15.3**
Chocolate	-	-	-	-	-	-	5	7.1	12	8.3	**17**	**7.9**	8	11.4	35	24.1	**43**	**20.0**	16	22.9	41	28.3	**57**	**26.5**	41	58.6	57	39.3	**98**	**45.6**
Honey, jam, molasses	13	18.6	29	20.0	**42**	**19.5**	41	58.6	83	57.2	**124**	**57.7**	13	18.6	24	16.6	**37**	**17.2**	3	4.3	7	4.8	**10**	**4.7**	-	-	2	1.4	**2**	**0.9**
Pastries	-	-	-	-	-	-	-	-	-	-	**-**	**-**	-	-	-	-	**-**	**-**	36	51.4	62	42.8	**98**	**45.6**	34	48.6	83	57.2	**117**	**54.4**
Drinks																														
Packaged juice	-	-	-	-	-	-	-	-	-	-	**-**	**-**	5	7.1	9	6.2	**14**	**6.5**	10	14.3	25	17.2	**35**	**16.3**	55	78.6	111	76.7	**166**	**77.2**
Asidic beverages	-	-	-	-	-	-	1	1.4	1	0.7	**2**	**0.9**	12	17.1	20	13.8	**32**	**14.9**	20	28.6	33	22.8	**53**	**24.7**	37	52.9	91	62.8	**128**	**59.5**
Tea	62	88.6	132	91.0	**194**	**90.2**	6	8.6	8	5.5	**14**	**6.5**	1	1.4	3	2.1	**4**	**1.9**	-	-	-	-	**-**	**-**	1	1.4	8	5.5	**3**	**1.4**
Coffee	9	12.9	15	10.3	**24**	**11.2**	14	20.0	32	22.1	**46**	**21.4**	15	21.4	24	16.6	**39**	**18.1**	11	15.7	27	18.6	**38**	**17.7**	21	30.0	47	32.4	**66**	**31.6**
Mineral water	-	-	-	-	-	-	2	2.9	2	1.4	**4**	**1.9**	11	15.7	12	8.3	**23**	**10.7**	13	18.6	17	11.7	**30**	**14.0**	44	62.9	114	78.6	**158**	**73.5**

Mean daily food consumption levels for all individuals in the study group are presented in Table 4.22. Milk product consumption levels of men were determined as 35.75±40.96 g for milk, 90.0±51.11 g for yogurt and 25.90±9.52 g for cheese. For women, milk, yogurt and cheese consumption levels were 35.75±40.96 g, 90.0±51.11 g and 25.90±9.52 g, respectively. It was determined that men consumed 31.97±15.12 g of eggs, 27.84±17.20 g of red meat, 38.40±21.29 g of chicken meat, 36.99±23.75 g of legumes, and 7.59±7.11 g of oilseeds. Women consumed 27.92±12.82 g of eggs, 27.04±14.36 g of red meat, 33.39±18.50 g of chicken meat, 36.48±26.37 g of legumes, and 7.84±7.64 g of oilseeds from meat-group foods. All elderly individuals consumed 125.33±60.19 g of vegetables and 129.20±64.92 g of fruits every day. Daily white bread consumption level (113.63±74.34 g in men, 89.07±64.32 g in women) was higher compared to bran bread consumption in both genders (61.22±77.91 g in male, 58.73±69.05 g in female). Bulgur, pasta, rice consumption was 55.0±21.75 g, 31.99±23.73 g, 34.23±21.20 g, respectively, in all individuals. Olive oil, sunflower seed oil, sugar, honey/jam/molasses consumption was 5.42±3.57 g, 10.57±4.48 g, 6.80±5.70 g, 16.73±8.21 g, respectively, in all individuals. Men drank 236.36±110.63 mL of tea daily and women drank 218.12±103.07 mL of tea daily on average.

Table 4.22. Daily food consumption amounts of individuals

	Males (n=70)	**Females (n=145)**	**Total (n=215)**
Foods (g)	**$\bar{X}$± SD**	**$\bar{X}$± SD**	**$\bar{X}$ ± SD**
Milk	35.75 ± 40.96	45.75 ± 51.98	42.50 ± 48.79
Kefir	2.67 ± 10.89	4.34 ± 18.41	3.80 ± 16.34
Buttermilk	37.47 ± 25.73	36.08 ± 31.78	36.53 ± 29.89
Yogurt	90.0 ± 51.11	80.65 ± 45.26	83.71 ± 47.33
Cheese	25.90 ± 9.52	24.27 ± 8.16	24.80 ± 8.64
Kashar cheese	9.39 ± 5.94	8.44 ± 6.14	8.75 ± 6.08
Egg	31.97 ± 15.12	27.92 ± 12.82	29.24 ± 13.71
Red meat	27.84 ± 17.20	27.04 ± 14.36	27.30 ± 15.31
Chicken	38.40 ± 21.29	33.39 ± 18.50	35.02 ± 19.54
Fish	7.24 ± 12.48	6.38 ± 11.56	6.66 ± 11.84
Legumes	36.99 ± 23.75	36.48 ± 26.37	36.65 ± 25.49
Oilseeds	7.59 ± 7.11	7.84 ± 7.64	7.76 ± 7.46
Leaf vegetables	6.43 ± 3.37	6.65 ± 3.39	6.58 ± 3.38
Other vegetables	129.12 ± 64.51	123.50 ± 58.14	125.33 ± 60.19
Fruits	128.03 ± 58.03	129.77 ± 68.18	129.20 ± 64.92
Dried fruits	1.25 ± 3.24	1.24 ± 3.54	1.24 ± 3.44
White bread	113.63 ± 74.34	89.07 ± 64.32	97.0 ± 68.55
Bran bread	61.22 ± 77.91	58.73 ± 69.05	59.54 ± 71.88
Bulgur	32.49 ± 20.68	28.13 ± 22.18	29.55 ± 21.75
Pasta, noodles	34.97 ± 22.76	30.55 ± 24.13	31.99 ± 23.73
Rice	35.59 ± 21.48	33.58 ± 21.11	34.23 ± 21.20
Borek	2.77 ± 3.05	3.15 ± 6.41	3.03 ± 5.54
Cookies, biscuits	6.27 ± 6.97	7.95 ± 7.77	7.40 ± 7.54
Olive	13.01 ± 5.98	11.33 ± 6.32	11.88 ± 6.25
Olive oil	5.41 ± 3.47	5.43 ± 3.63	5.42 ± 3.57
Sunflower seed, corn oil	10.79 ± 4.76	10.46 ± 4.35	10.57 ± 4.48
Butter	3.03 ± 4.34	2.95 ± 4.16	2.98 ± 4.21
Margarine	2.73 ± 3.55	2.39 ± 3.07	2.50 ± 3.23
Sugar	7.18 ± 6.46	6.62 ± 5.30	6.80 ± 5.70
Chocolate	5.70 ± 10.81	7.54 ± 10.14	6.94 ± 10.38
Honey, jam, molasses	16.60 ± 8.18	16.79 ± 8.25	16.73 ± 8.21
Pastries	1.37 ± 1.48	1.20 ± 1.64	1.26 ± 1.59
Milky desserts	7.04 ± 8.14	8.70 ± 9.85	8.16 ± 9.34
Packaged juice	5.51 ± 14.89	5.38 ± 14.03	5.42 ± 14.28
Acidic beverages	16.20 ± 28.50	11.93 ± 23.49	13.32 ± 25.25
Tea	236.36 ± 110.63	218.12 ± 103.07	224.06 ±105.68
Coffee	12.25 ± 13.80	12.37 ± 15.45	12.33 ± 14.90
Mineral water	11.26 ± 21.11	5.68 ± 15.07	7.50 ± 17.42

Food consumption records for a single day were requested from the participants. Used vitamins and/or minerals have not been included in food consumption. Assessments performed by comparing energy and nutrient consumption from these records, and reference intake levels are presented in Table 4.23. Internationally-accepted RDA levels and reference intake levels in Turkey Dietary Guidelines have been evaluated. Mean daily energy intake of individuals was 1818.1±296.9 kcal in men, and 1647.8±215.1 kcal in women. In men, 15.4%±2.7% of the energy was met from proteins, 46.7%±6.1% from carbohydrates, and 37.4%±5.7% from fats. In women, these rates were 15.1%±3.0% from proteins, 45.3%±6.2% from carbohydrates and 39.4%±5.8% from fats, respectively. As per RDA levels, 90.9% of the daily energy requirement was met in men, and it was 102.9% in women. According to Turkey Dietary Guidelines, 97.7% of daily energy requirement was met in men, and it was 111.3% in women. According to RDA, the percentage of meeting fiber requirement was higher in men compared to women. Upon checking the fiber requirement levels in Turkey Dietary Guidelines, the percentage of meeting fiber requirement levels was higher in women compared to men. Cholesterol intake levels were similar in both groups.

The percentage of meeting daily requirements according to the daily intake of vitamin-minerals was evaluated as per RDA levels for the individuals in the study. Accordingly, vitamin B1, B6, folate, potassium, calcium and magnesium intake of both genders were below required levels. Men met 66.6% of vitamin B1 requirement, 70.5% of vitamin B6, 75% of folate, 46.2% of potassium, 56% of calcium, and 63% of magnesium. Meanwhile, women met 63.6% of vitamin B1 requirement, 73.3% of vitamin B6, 67.8% of folate, 43.4% of potassium, 53.2% of calcium, and 75.8% of magnesium (Table 4.23).

By checking reference intake levels for vitamins-minerals from Turkey Dietary Guidelines, it was determined that the intake of vitamin B12 (87.5%), vitamin B1 (66.6%), vitamin B6 (70.5%), vitamin C (81.1%), potassium (46.2%), calcium (70.8%) and magnesium (75.6%) were below the requirements in men. Also, the intake of Vitamin B12 (87.5%), vitamin B1 (63.6%), vitamin B6 (73.3%), folate (82.2%), potassium (43.4%), calcium (67.2%) and magnesium (80.9%) were below the stated requirements in women. A statistically significant difference was determined between genders with regard to daily intake levels of energy, protein, fat percentage, carbohydrates, fibres, vitamin B1, vitamin B2, vitamin B6, vitamin C, sodium, phosphorus, and zinc, which

were obtained with daily food consumption records requested from the individuals ($p<0.05$). No statistically significant difference was determined for other nutrients ($p>0.05$). (Table 4.23).

Table 4.23. Daily energy and nutrient consumption levels and percentage of meeting requirements

Energy and Nutrients	Male			Female			Total		
	X̄±SD	RDA (%)	Turkey Dietary Guidelines (%)	X̄±SS	RDA (%)	Turkey Dietary Guidelines (%)	X̄±SD	t	p*
Energy (kcal)	**1818.1 ± 296.9**	90.9	97.7	**1647.8 ± 215.1**	102.9	111.3	1703.2 ± 256.8	4.286	**<0.01****
Protein (g)	**68.6 ± 15.8**	122.5	-	**61.0 ± 14.6**	132.6	-	63.5 ± 15.4	3.460	**<0.01****
Protein (%)	**15.4 ± 2.71**	-	-	**15.1 ± 3.0**	-	-	15.2 ± 2.9	0.736	0.46
Fat (g)	**76.3 ± 16.2**	-	-	**73.1 ± 15.0**	-	-	74.2 ± 15.4	0.572	0.15
Fat (%)	**37.4 ± 5.7**	-	-	**39.4 ± 5.8**	-	-	38.7 ± 5.8	-2.327	**0.02****
Carbohydrates (g)	**208.1 ± 44.0**	160.0	-	**182.3 ± 32.7**	140.2	-	190.7 ± 38.6	4.345	**<0.01****
Carbohydrates (%)	**46.7 ± 6.1**	-	-	**45.3 ± 6.2**	-	-	45.8 ± 6.2	1.456	0.14
Fibre (g)	**23.8 ± 7.8**	95.2	79.3	**21.6 ± 6.5**	72.0	86.4	22.3 ± 7.0	1.990	**0.04****
Cholesterol (mg)	**281.2 ± 132.6**	140.6	140.6	**260.7 ± 132.2**	130.3	130.3	267.3 ± 132.4	1.062	0.28
Vitamin A (µg)	**951.1 ± 611.1**	105.6	126.8	**1027.9 ± 989.3**	146.8	158.1	1002.9 ± 883.3	-0.596	0.55
Vitamin B12 (µg)	**3.5 ± 2.2**	145.8	87.5	**3.5 ± 3.7**	145.8	87.5	3.5 ± 3.3	-0.024	0.98
Vitamin E (mg)	**17.5 ± 6.7**	116.6	134.6	**16.7 ± 6.0**	111.3	151.8	17.0 ± 6.3	0.816	0.41
Vitamin B1 (mg)	**0.8 ± 0.2**	66.6	66.6	**0.7 ± 0.1**	63.6	63.6	0.7 ± 0.2	2.462	**0.01****
Vitamin B2 (mg)	**1.3 ± 0.2**	100.0	100.0	**1.2 ± 0.3**	109.9	109.9	1.2 ± 0.3	2.114	**0.03****
Vitamin B6 (mg)	**1.2 ± 0.3**	70.5	70.5	**1.1 ± 0.2**	73.3	73.3	1.2 ± 0.3	2.188	**0.03****
Vitamin C (mg)	**89.3 ± 61.0**	99.2	81.1	**92.9 ± 52.8**	123.8	97.7	91.7 ± 55.5	3.128	**<0.01****
Folate (µg)	**300.0 ± 67.9**	75.0	90.9	**271.3 ± 60.7**	67.8	82.2	280.6 ± 64.4	-0.449	0.65
Sodium (mg)	**4303.6 ± 1169.5**	358.6	358.6	**3895.8 ± 1268.7**	324.6	324.6	4028.6 ± 1249.4	2.264	**0.02****
Potassium (mg)	**2175.9 ± 627.6**	46.2	46.2	**2042.9 ± 470.7**	43.4	43.4	2086.2 ± 529.2	1.573	0.11
Calcium (mg)	**672.8 ± 198.4**	56.0	70.8	**639.3 ± 189.3**	53.2	67.2	650.2 ± 192.5	1.195	0.23
Magnesium (mg)	**264.9 ± 102.4**	63.0	75.6	**242.8 ± 70.8**	75.8	80.9	250.0 ± 82.8	1.630	0.10
Phosphorus (mg)	**1126.2 ± 263.9**	160.8	204.7	**1026.0 ± 232.4**	146.5	186.5	1058.6 ± 247.0	2.833	**<0.01****
Iron (mg)	**11.2 ± 3.3**	140.0	101.8	**10.3 ± 2.6**	128.7	93.6	10.6 ± 2.9	1.907	**0.06**
Zinc (mg)	**10.0 ± 2.7**	90.9	100.0	**9.1 ± 2.5**	113.7	91.0	9.4 ± 2.6	2.448	0.01**

** Student t test, **p<0.05*

According to the nutritional status of elderly individuals, a statistically significant difference was determined between age, marital status, appetite status, difficulty in chewing-swallowing, meal skipping, teeth loss, depression diagnosis, anthropometric measurements, and daily energy and macronutrient intake. Regression analysis was performed in order to rule out confounding factors (Table 4.24).

Table 4.24. Malnutrition risk and the relation between marital status, loss of teeth, appetite status, and depression diagnoses (Logistic regression)

	OR	**95%CI**	**p-value**
Marital status			
Single (ref)			
Married	0.44	0.20-0.97	0.04
Loss of teeth			
No loss of teeth (ref)			
There is loss of teeth	3.12	1.35-7.20	0.008
State of Appetite			
Normal (ref)			
Good	0.14	0.52-0.39	0.001
Poor	9.3	2.3-37.19	0.002
Depression diagnosis			
No (ref)			
Yes	4.58	1.52-13.77	0.007

5. DISCUSSION AND CONCLUSION

Older adults experience a number of social, physiological and psychological changes that affect their feeding processes and ultimately energy intakes. These changes may cause to an increased malnutrition or malnutrition risk prevalence in the elderly population (66). Malnutrition may cause a decrease in functional status, deterioration of existing medical problems, and even an increase in mortality rates and affect negatively the well-being of elder people. Careful nutritional assessment and nutritional training are necessary to successfully diagnose malnutrition in older people and to develop appropriate and comprehensive treatment plans (30). The aim of this study was to evaluate malnutrition risk screening and nutritional status with the MNA-long form screening tool to determine in individuals aged 65 years and above and to investigate the factors affecting this condition.

5.1. Demographic Characteristics of Individuals

This study was carried out with a total of 215 older people aged 65 and over (32.6% male, 67.4% female). Forty four point two percent of all individuals are 75-85 years old, 42.8% of them are 65-74 years old and 13% of them are 85 years and older, and the mean age of male is 78.6±6.8 years and mean age of female is 74.9±6.9 years. According to a study conducted by Saka et al. (61), nutritional status of older people was evaluated in a university hospital in Istanbul and the rates of male and female olders were 34% and 66%, respectively. In the same study, 50% of the older people are 65-74 years old, 41% of them are 75-85 years old and 9% of them are 85 years and older.

The level of education of individuals in our study is as follows: 7.4% of the individuals were illiterate, 44.2% of them graduated from primary school (41.4% of male, 45.5% of female) 20% of them graduated from high school (22.9% of male and 18.6% of female), and 9.8% (10.0% of male and 9.7% of female) of them graduated from secondary school . According to 2016 data of Turkish Statistical Institute, the rate of illiterate elder female is 32.6% and rate of male is %8.2 who are 65 years old and above. The rate of primary school graduates is 43%, the rate of secondary school is 5,6% and rates of high school or equivalent is 5.4% (25). In the study conducted by Hoca and Türker (162), in

order to investigate the nutritional status and habits of elderly individuals found that the average age of men was 72.2±5.3 years and 73.6±5.9 years for women. According to the study, 3.8% of the elderly were illiterate, 45.2% were primary, 10.5% were secondary school and equivalent, 17.1% were high school and equivalent and 16.7% were university graduates.

In another study conducted with elderly individuals, the average age of the individuals is 71.63±5.68 years. It was determined that 67.2% of women were illiterate, 42.9% of men were primary school graduates and 65.5% of all individuals were married and 13.6% of them were living alone (163). In our study, 54% of individuals (80% of men and 41.4% of women) are married. 16.3% of all elderly population, 8.6% of males and 18.6% of females live alone (table 4.1). In a study conducted by Sánchez-García et al. (13), was found that the average age of all elderly individuals (n=1968) was 68.6 years, 62.5% of primary school graduates and 70.7% of them were married.

5.2. Individual's Health Status

According to our study, the most common diseases in males were hypertension (70%), cardiovascular disease (52.9%), osteoporosis (41.4%), diabetes (38.6%) and in females, it was hypertension (71%), osteoporosis (60.7%), diabetes (44.1%) and cardiovascular disease (39.3%), respectively. There was a statistically significant difference between osteoporosis, falling history and hyperlipidemia by gender. According to Yılmaz and Çağlayan's study (164), %71.2 of older people have at least one chronic disease. Of the patients with chronic disease, 36.6% stated that they had hypertension, 32.9% of them had diabetes and 22.7% of them had cardiovascular diseases. In another study, hypertension is the most common chronic disease in the elderly with 62.9% rate. High cholesterol (38.1%) and diabetes (33.3%) are detected after hypertension (162). In a study conducted by Yardımcı et al. (163), with elder individuals, in both genders, hypertension was in the first rank (82.8% in female, 65.8% in male), diabetes was in the second rank (51.7% in female, 44.7% in male) and hypercholesterolemia/heart disease was in the third rank (24.1% in female, 28.9% in male).

Adequate and balanced nutrition is important in controlling and preventing chronic diseases in every age group (165). The majority of individuals in our study have

chronic diseases that require proper nutritional treatment. However, only 19.5% of the individuals in our study stated that they applied a diet program recommended by a dietician and 80.5% of them stated that they did not apply any diet program. According to a study conducted by Sönmez et al. (166), 36.2% of older people are literate, 66.2% of them are married and 22.3% of them live alone. It was determined that due to health problems, 33.8% of them apply for a diet program, 40. 0% of them do not care about meal times.

Multiple drug use is common in the elderly patient population, who are more sensitive to drug adverse effects. In addition, the use of multiple drugs increases the possibility of increasing drug-drug, drug-nutrient and drug-disease interactions, resulting in greater risks for the patient due to worsening health (167). According to study conducted by Öztürk and Uğraş (168), that they evaluated polypharmacy in elder patients (n=218), hypertension (48.1%), coronary artery disease (27.0%), diabetes mellitus (23.2%), respiratory diseases (17.2%) and hyperlipidemia (12.8%) were the most common diseases, respectively. Multiple drug use was observed in elder patients, and 17.8% of patients did not use regular medication, 10% of them use one drug, 13.7% of them use two drugs, 11.3% of them use three drugs, 8.7% of them use four drugs and 38% of them 5 or more drugs at the same time, and the rate of a female was found to be higher. In another study, it was determined that mean drug number of outpatients was 5±3 and 7±3 in hospitalized in elder patients (61). The number of drugs used by elder people in our study is shown in Table 4. 3. Forty-seven point one percent of male and 55.2% of female use more than 5 drugs and it was not found a statistically significant difference between the number of drugs used by gender (table 4.3). According to another study, it was found that 35% of older people with a mean age of 76.9 years (n = 59) used 5 or more drugs in a day. It was not found a significant difference between polypharmacy by gender, age range, and educational background, however, there was a significant difference between the presence of hypertension, diabetes and cancer and polypharmacy ($p<0.05$) (71).

Most elderly people with weight loss have one or more deficiencies in mineral or vitamin levels. It is possible to improve nutritional status through dietary interventions with physiological doses of water-soluble vitamins. However, there is no consensus for specific support. Vitamin D deficiency is more common in the elder people and it is important. It was shown that Vitamin D supplementation healed physical function and

mineral density in elder people whose vitamin D level is low (169). In our study, the use of vitamin and/or mineral supplementation of individuals was examined and it was determined that 53% of all individuals were using it. Although females (55.2%) were more likely to use it than males (48.6%), it was not found a statistically significant difference between the use of nutritional support by gender ($p>0.05$). When the type of nutritional support was examined, it was determined that 51.8% of the individuals used vitamin D, 26.3% of them used vitamin B12, 14.9% of them used omega-3 and 11.4% of them used multivitamin-mineral.

Oral health affects chewing ability, taste perception, and swallowing capacity. The negative impact of bad oral conditions on quality of life has been proven in many studies and it is an important issue In the studies conducted, it was found problems between malnutrition and oral health, chewing problems, dental status, tongue changes, salivation and relation between candidiasis (73). In a study evaluating the nutritional status of elder individuals (58.2% female), it was detected that the mean age of individuals was 84.7±4.6 years and 44.4% of them had difficulty in chewing and swallowing (170). Loss of teeth is an important problem for the elder population. Patients with loss of teeth often choose cooked or processed foods instead of fresh foods. Some of them have to eliminate all food groups, which causes to consume fewer vegetables, less carotene and fiber, more cholesterol, saturated fat, and caloric intake. Intensive loss of teeth reduces chewing performance and affects the choice of food that leads to malnutrition. Conventional complete prosthesis is the most commonly used rehabilitation procedure for toothless patients. However, dental plates affect the ability to chewing due to it requires more strokes and time to chew food. Negative impact on reduced chewing performance and taste, food selection and difficulty in swallowing cause drowning, low dietary quality and low overall health status (171).

The chewing-swallowing difficulties and dental problems in our study were investigated and shown in Table 4.5. According to this, the rate of a male having chewing-swallowing difficulties is 24.3% and female are 23.4%. There was no statistically significant difference between gender and chewing-swallowing difficulties. Thirty point two percent of elder individuals reported a loss of teeth, 54.9% of them stated used a complete prosthesis and 14.9% of them indicated that they had no loss of teeth. Thirty-two point nine percent of male and 29% of female have loss of teeth. There was no statistically significant difference between gender and presence of loss of teeth difficulties

(p>0.05). The chewing- swallowing difficulties and the dental health of the individuals in our study were examined. According to this, chewing and swallowing difficulties were observed in 17.4% of individuals aged 65-74 years, 22.1% of individuals aged 75-84 years, and in 50% of individuals aged 85 years and above. There was a statistically significant difference between the age range and chewing-swallowing difficulty (p<0.01). Accordingly, as the age increases, the rate of chewing-swallowing difficulty in elder individuals increases. Although the incidence of loss of teeth was 42.9% in individuals aged 85 years and above and 26.1% in the 65-74 age group, there was no statistically significant difference between the age range and the presence of loss of teeth. The nutritional status and chewing-swallowing difficulty and loss of teeth of the individuals in our study were examined and, accordingly, the presence of malnutrition risk or patient with malnutrition was significantly higher in patients with having difficulty in chewing-swallowing and loss of teeth. According to the study by Banerjee et al. (172), approximately 95% of the individuals have Geriatric Oral Health Assessment Index scores between 12 and 57, meaning "need dental care". According to MNA, malnutrition risk was found in 70% of the individuals and malnutrition was found in 19.5% of them. As a result of the study, low nutritional status was found to be related to bad oral health in elder people.

The cigarette and alcohol consumption status of the research group in our study is as follows: 7.4% of the individuals still smoke, 33% of them previously smoked and 59.5% of them never smoked. Ninety-three percent of older people do not consume alcohol. According to Yılmaz and Çağlayan's study (164), 39.5% of elder individuals (n=382) did not smoke and 87.7% of them did not consume alcohol. In another study in which the nutritional status and habits of the elder people were investigated, 13.8% of the individuals smoked, 41.9% of them stopped smoking and 44.3% of them did not smoke. 65.7% of the elder people do not use alcohol (162).

Physical activity is closely related to healthy aging. With regular physical activity, functional capacity, quality of life and psychological well-being can be effectively increased. Health professionals report that the lifestyle should be regulated in such a way that the physical activity is made daily, preferably at least 30 minutes as moderate per day, or 3 days and 20 minutes as a severe per week (173). In a study conducted, it is shown that proper diet intake in elder adults is associated with physical activity. In other word, "optimal" intake of meat, fish and seafood, legume family, grains, fruit, and bread

are related to preferable physical activity levels (174). According to another study, it was determined that the good physical function in elder individuals was associated with low age, daily walking habits, good cognitive capacity, and quality of diet. Furthermore, the relationship between the ratio of polyunsaturated fatty acids to saturated fat and berry consumption and good physical function was also found (175). The physical activity of the research group in our study was questioned and the results are shown in Table 4.10. While 28.4% of elder individuals have regular physical activity, 71.6% of them do not. Although the rate of female physical activity (30.3%) was higher than the rate of male (24.3%) and there was not found a statistically significant difference between physical activity and gender ($p>0.05$). In a study conducted with elder individuals living in Ankara (n=110), 40% of the individuals performed physical activity (163).

5.3. Nutritional Habits

Information on the nutritional habits of individuals in our study is shown in Table 4.6. Fifty one point six percent of the elderly individuals have a normal appetite, 38.2% have a good appetite and 10.2% have a poor appetite. The ratio of a male with poor appetite is 11.4% and female are 9.7%. The percentage of elderly people fed three square meals a day is 66.5%. Sixty one point four percent of male and 49% of female consume only 1 snack meal a day. Twenty four point two percent of olders stated they always skip a mean meal, 38.1% of them sometimes skip a mean meal and 37.7% of them do not skip a mean meal. Seventy-nine point one percent of those who skip a meal, skip lunch. The rate of a female who skip lunch was 81.9% and this rate in male was 72.5%. The reason for skipping meals was stated as ‘getting up late in the morning’ in 48.5% of individuals, ‘do not want-lack of appetite’ in 39.6%, ‘not accustomed to’ in 29.9%.

According to a study, 56.4% (n=110) of elder individuals have three square meals a day and 43.6% of them have two meals a day. Sixty four point five percent of individuals skip a meal, and the most skipped meal is lunch (81.7%). In the study, the reason for skipping the meal was having breakfast late at the rate of 61.9% (163). According to another study, 23.8% of male consumed one snack a day, 50.5% of them consumed two snacks a day, 25.7% of them consumed three snacks a day, 11.4% of female consumed one snack a day, 52.4% of them consumed two snacks a day and 36.2% of them consumed

three snacks a day. It was seen that 7.6% of male and 4.8% of a female who participated in the study do not skip any snack. The most skipped meal is lunch (46.2%). Among the most common causes of skipping mean meal are (69.2%) “not accustomed to” and (30.8%) “having breakfast late” (162).

Adequate fluid intake in older adults helps to promote good physical and mental functions by reducing the risk of cognitive impairment, confusion, constipation, hospitalization and repeated hospitalizations (150). According to Turkey Dietary Guidelines, the water need for male above 65 years old is 2500 mL/day and it is 2000 mL/day for a female. In our study, the daily water consumption of individuals by gender was investigated and shown in Table 4.8. Accordingly, the mean daily water consumption of female (1208.9±502.7 mL) is significantly higher than male (1018.5±375.0 mL), but water consumption in both genders is far below the requirement. According to the nutritional status of the research group, water consumption was evaluated. Individuals with malnutrition risk or malnutrition consume 1045.0±452.2 mL of water daily. There was a statistically significant difference between water consumption and nutritional status ($p<0.05$). In a study conducted by Fernandez-Barres et al. (176), that they evaluated nutritional consumption of individuals with malnutrition risk (n=190), male consume 766.1±344 mL water in a day and female consume 646.9±344.4 mL water in a day. There was a statistically significant difference between water consumption and gender ($p<0.05$).

5.4. Anthropometric Measurements

Anthropometric evaluation is an essential part of geriatric nutrition assessment for malnutrition, overweight, obesity, loss of muscle mass, increase in fat mass and redistribution of adipose tissue (13). In our study, the mean BMI of a male was 27.4±4.7 kg/m^2, while the mean BMI of a female was 28.8±5.1 kg/m^2. In a study conducted by Bahat et al. (177), the mean age of female living in the Turkish population was determined as 73.3±6.9 (n=438) and the mean BMI was detected as 27.8±5.2 kg/m^2. In a study conducted by Tufan et al. (178), the mean age of Turkish male living eventide home was determined as 73.1±6.7 and the mean BMI was detected as 27.8±5.2 kg/m^2. In another study conducted with elderly individuals, the mean BMI value was found to be 30.95±5.33 kg/m^2 (32.76±5.74 kg/m^2 in female, 28.71±3.77 kg/m^2 in male) (163). In a

study conducted by Boscatto et al. (170), and evaluated the nutritional status of elder individuals, the mean age of individuals is 84.7±4.6 years and 58.2% of female. The mean BMI in female was 26.9±4.83 kg/m^2 and in male was 24.64±3.80 kg/m^2. The total prevalence of the underweight people was 18.8% and of overweight was 42.1% by BMI, respectively.

The assessment of weight loss as an indicator of bad nutritional status in the elder people is associated with mortality risk. Recent studies have suggested that changes in MUAC may also be associated with an increased risk of mortality in elder individuals. In a study conducted by Schaap et al. (117), decrease in mid-upper arm circumference is not related mortality in people who have higher MUAC (>31 cm) in starting, ≤ -2.15 cm decrease in individuals with low (<31 cm) MUAC is related to increase of mortality risk. As shown in Table 4.11 in our study, means of mid-upper arm circumference in both male and female individuals (28.3±4.2 cm, 28.6±3.9 cm respectively) are close to each other. As shown in Table 4.12, MUAC is over 22 cm in 94% of individuals. In a study conducted by Gültekin and K.Özer (179), means of mid-upper arm circumference were reported as 26.9±36.6 cm in male, 29.0±33.2 cm in female and there was a statistically significant difference.

In our study, it was determined that there is a statistically significant difference between the anthropometric measurements of the individuals and the body weight, height, hip circumference and waist/hip ratio according to gender ($p<0.01$). According to a study, BMI averages of the male were 29.81±4.68 kg/m^2 and of the female were 32.39±5.85 kg/m^2, and there was statistically significant body weight, BMI and waist/hip ratio by gender (162).

In our study, the mean body weight of male (75.6±13.2 kg) is higher than the body weight of female (68.6±13.0 kg). The mean of the height is 166.1±7.9 cm in male and 154.1±5.8 cm in female. The mean waist circumference of a male was 101.8±13.6 cm and female and which 100.1±12.4 cm. When the waist/hip ratio of the individuals is examined, it is seen that the mean of waist/hip ratio of male (1.0±0.11) is higher than the waist/hip average of female (0.9±0.1). The mean calf circumference of a male was 34.8±3.7 cm and of female was 34.7±4.1 cm. In a study conducted by Sánchez-García that they evaluated anthropometric measurements of elder individuals, the mean weights were found to be 62.7±11.6 kg in female, 70.3±12.3 kg in male ($p <0.05$), the mean height

was detected 152.6±7.5 cm in female and 163.2±8.5 cm in male ($p < 0.05$). In the study, 62.3% of the individuals had a BMI value of ≥25 kg/m^2. It was detected that the mean waist circumference was 93.7±13.4 cm in female and 95.5±14.4 cm in male, and mean waist/hip circumference was 0.9±0.08 in female and 0.95±0.06 in male, and the mean waist/hip circumference was 34.5±8.3 cm in male and 35.2±8.6 cm in female (13).

In our study, according to the BMI classification determined by WHO, 2.3% of all individuals were underweight, 23.7% of them were normal, 40% of them were mildly obese and 34% of them were obese. In terms of metabolic diseases, the majority of male and female in the high-risk group (54.3%, 83.4%, respectively) were observed. Ninety seven point nine percent of female and 57.1% of the male were abdominal fat according to waist-hip ratio. In a study evaluating the nutritional status of elder individual in a university hospital in Istanbul, it was detected that 8% of elder individual have <20.0 kg/m^2, 36% of them have 20.0-24.9 kg/m^2, 33% of them have 25.0-29.9 kg/m^2 and 23% of them have ≥30 kg/m^2 BMI values (61). In a study evaluating the anthropometric measurements of 164 individuals (91 female, 73 male) aged 65 years and above living in a nursing home in Ankara, 43.8% of female individuals have ≥30 kg/m^2, 37.3% of them have 25-29.9 kg/m^2 BMI values. It was detected that 15.3% of male have ≥30 kg/m^2, 38.4% of them have 18.5-24.9 kg/m^2 and 24.1% have 25-29.9 kg/m^2 BMI values (179). In a study conducted by López-Ortega and Arroyo (107), that they evaluated anthropometric measurements of Mexican elder individuals, it was found that male had higher body weight and height than female, and female had a mean BMI of 28.7 kg/m^2 and the male had a mean BMI 26.8 kg/m^2. It was found that 42.4% of female was slightly overweight, 21.9% of them were obese, 2.3% of them were underweight and 35.7% of the male was slightly overweight, 37.3% of them were obese and 1.9% of them were underweight.

Among the individuals in our study, the proportion of those who were more underweight according to the BMI classification increased with age. It was seen that as age is increased, the ratio of those who have calf circumference under 31cm and have mid-upper arm circumference under 22 cm is increased. Statistically, a significant difference was found between calf circumference by age groups ($p<0.01$). In a study conducted, anthropometric measurements of the young group are investigated by the elder group. 173 female (54.7%) and 143 male (45.3%) were included in the study. At the end of the study, body weight and BMI were found to be higher in younger female (60-64

years) than in elder ones (80 years old and above). The arm circumference, triceps skinfold thickness, and arm muscle circumference are lower in female aged 75-64 than in female aged 60-64 years. In the male, the arm circumference and arm muscle circumference are lower in the oldest group (≥ 80 years) compared to the youngest group (60 to 74 years). The study shows that changes in body sizes occur differently between increasing age and gender. There was a statistically significant difference in terms of weight, height, waist circumference, hip circumference, calf circumference, BMI and knee height by age groups ($p < 0.01$), but there was no a significant difference in waist-hip circumference (107).

5.5. Nutritional Status

Malnutrition is a multifactorial condition among elder people. According to a systematic review, demographic characteristics, financial characteristics, food access and appetite status, lifestyle, psychological characteristics, physical functioning, disease, oral health, and social factors can be effective in malnutrition (180). In our study, it was detected that 72.1% of individuals had a normal nutritional status, 24.7% of them had malnutrition risk and 3.3% of them had malnutrition. Malnutrition risk is 23.4% for female and 27.1% for male, while malnutrition rate is 1.4% for male and 4.1% for female (Table 4.14). Statistically, a significant difference was found between the individuals' nutritional status and increased age, marital status, appetite, chewing-swallowing difficulty, loss of teeth and skipping meals ($p<0.05$). The study found that people with a risk of malnutrition are relatively common in geriatric patients.

The current diseases of individuals in our study according to MNA classification are as follows: the most common diseases in patients with malnutrition risk are hypertension (60.4%), muscle disease (58.5%), cardiovascular disease (47.2%), diabetes (45.3%), gastrointestinal disease (35.8%), kidney disease (26.4%), respectively. The most common diseases in patients with malnutrition are cardiovascular disease (71.4%), muscle disease (57.1%), hypertension (57.1%) and digestive system disease (57.1%). In a study conducted in a university hospital in Istanbul, 32% of patients with normal MNA score had depression, 31% of them had fall history, 28% of them had diabetes, 25% of them had neurological disease, 61% of the individuals with lower MNA score than 23

had depression, 49% of them had neurological disease, 43% of them had fall history and 24% of them had diabetes (61).

In a study conducted by Ulger et al. (60), they evaluated malnutrition risk in 2327 elder individuals whose mean age is 72.1 (63.6% female). As a result of the study, the most common comorbid disease in a patient is hypertension (71.7%) and malnutrition risk was determined in 28% of individuals. Twenty six point seven percent of individuals with malnutrition risk exercise but there was no statistical significance. In our study, physical activity status of individuals by nutritional status is assessed. Accordingly, the rate of exercise in a group with malnutrition/malnutrition risk is 16.7%. There was a statistically significant difference between making physical activity and nutritional status ($p<0.05$). In another study, the prevalence of malnutrition and malnutrition risk was found to be 17% and 58%, respectively, in the 448 (38% male) elder individuals with a mean age of 80 years. Depression, inactivity, and smoking were associated with an increased risk of malnutrition (181).

In a study conducted with female elder individuals (n=438) with a mean age of 73.3±6.9 years, malnutrition was detected in 5% of the individuals and malnutrition risk was determined in 24.7% of them (177). In another study conducted in Turkey, 65 years and above 1030 elder individuals screened for malnutrition and its associated risk factors were investigated. As a result of the study, malnutrition risk was found in 29.1% of the individuals and malnutrition was found in 19% of the patients. There was a significant difference between the malnutrition group and other groups in terms of mean depression score, income status, educational background, number of children, functional status and number of comorbid diseases. According to the logistic regression analysis in the study, age, BMI, educational background, comorbidity, and depression score were independently related to malnutrition (63). In a study conducted by Koza´kova´ ve Zelenı´kova´(96), nutritional status was evaluated in elder individuals (470 elder individuals whose mean age is 74.1 (46% male, 54% female)) by using different screening tools. According to the results of MNA, it was detected that 42.3% of the individuals in the study had normal nutritional status, 38.5% of them had malnutrition risk and 19.2% of them had malnutrition. In a study conducted by Ulger et al. (60), depression rate in individuals who have malnutrition risk is 37.4% is statistically significant than other individuals who do not have a risk ($p<0.01$). In our study, a

significant difference is found between nutritional status and the presence of depression diagnose of individuals.

In a study conducted by Torres et al. (182), malnutrition has been found to be independently associated with female gender, old age, widowhood, low level of education, low income, low BMI, depressive symptomatology, and use of more than 3 medications. In another study, nutritional status and risk factors affecting the elder individuals (n=169) were investigated and malnutrition risk was found in 43.2% of the individuals and malnutrition was found in 5.3% of them. In the study, it was concluded that malnutrition risk or malnutrition is related to increased age, economic status, marital status, living alone, chronic and intermittent pain, chewing difficulties, swallowing disorders, dental problems and drug use (183). In a study conducted by Mitri et al. (184), and evaluated nutritional status and risk factors affecting the elder individuals (n=905), malnutrition risk was found in 45.5% of the individuals and malnutrition was found in 2.8% of them. In the study, it was concluded that the high number of chronic diseases, bad oral and dental health, depressive disorders, higher BMI values, and disability were included in the variables that were significantly associated with the malnutrition status. In a study conducted by Agarwalla et al. (185), a total of 360 older individuals' nutritional status was evaluated and it was detected that 15% of them malnutrition and 55% of them have malnutrition risk. The relationship between nutritional status, increased age, female gender, loss of appetite, chewing and swallowing difficulty, dependent functional status, inadequate financial status, and daily caloric intake were found to be significant.

In our study, 40% of the individuals with malnutrition risk or malnutrition are 75-84 years old, 36.7% of them are 65-74 years old, 23.3% of them are 85 years old and above. 45.2% of the individuals in the other group are 65-74 years old and 45.8% of them are 75-84 years old. There was a statistically significant difference between age range and nutritional status. In a study conducted by a university hospital in Istanbul that evaluated the nutritional status of elder individuals, it was determined that 29.5% of the outpatients had malnutrition, 27.5%, of them had malnutrition risk, 7.5%, of them, had malnutrition 39.3% of hospitalized elder patients had malnutrition risk and 25.4% of them had malnutrition. In the same study, when different age groups are considered, 32% of the young elders (65-74 years), 56% middle elders (75-84 years) and 51% of the older elders (85 years and older) have malnutrition risk. The malnutrition rate in these age ranges is 8%, 16% and 26%, respectively (61). In a study conducted by Damayanthi et al. (186),

malnutrition prevalence and related factors were investigated in elder individuals in Sri Lanka. Malnutrition was found in 12.5% of 999 elder individual whose mean age is 70,8 and malnutrition risk was detected in 52.5% of them. In the study, increasing age, hypertension, and alcohol consumption were positively related to malnutrition.

In a study, the nutritional status of the elder individuals living in the community and nursing home (n=1098) was screened by MNA-short form and malnutrition was determined in 21.4% of the individuals. In the study, malnutrition and individuals with malnutrition had more difficulty in swallowing, loss of appetite, cognitive impairment, mobility disorder, and falling history as compared to normal nutritional individuals and a statistically significant difference was found ($p<0.01$). In addition, in patients whose nutritional status is good (63.3%) have more hypertension frequency compared to malnutrition (43.3%) and a statistically significant difference was found (187). Similar results were also found in our study. In our study, 74.8% of individuals with good nutritional status and 60% of individuals with malnutrition had hypertension and this difference was statistically significant.

Individuals in our study were classified by MNA results and evaluated by two different BMI values. According to BMI classification determined by WHO standards, 57.1% of individuals with malnutrition are underweight. According to the other classification (BMI<22), 85.7% of individuals with malnutrition are underweight. According to the BMI (WHO) classification of individuals at risk for malnutrition, 37.7% of them are normal, 35.8% of them overweight and 22.6% of them 1st degree obese. According to other BMI classification, 22.6% of them are underweight, 39.6% of them normal and 37.7% of them are overweight (Table 4.18). In our study, a statistically significant difference was found between nutritional status and mean body weight, BMI, MUAC, calf circumference, waist circumference and hip circumference ($p<0.01$). In another study, the mean MNA score of 190 elder individuals (67.5% female) with an average age of 85 years was 20 and 21% of them are underweight, 43.2% of them overweight-obese (176).

In another study evaluating the nutritional status of elderly individuals, there were 235 individuals (59.4% female, 40.6% male) aged 60 years or above. In the study, malnutrition was found in 10%, malnutrition risk was found in 29%, and normal nutritional status was found in 61% of elder individuals. Female were significantly more

malnourished than male. Being older, having lower income, lower level of literacy, reduced food intake and less food consumption are independently associated with low MNA scores. In the same study, 52.2% of individuals with malnutrition are fed with one meal, 29% of them have with two meals, 66.9% of individuals with malnutrition risk have two meals, 79.2% of individuals with normal nutritional status have two meals and 20.8% of them have three meals (188). According to our study, 38.3% of individuals with malnutrition risk or malnutrition have 2 main meals, 61.7% of them have 3 main meals and 75% of them have frequently skipped meals.

In our study, according to the nutritional status of the individuals, the macronutrient intake and average water consumption were evaluated. In our study, individuals with malnutrition risk or malnutrition have an average daily 1534.5±228 kcal of energy, 168.5±32.5 g of carbohydrate, 60.8±16.2 g of protein, 66.9±14.0 g of fat, 19,1±5.5 g of pulp and 1045.0±452.2 mL of water. In individuals with normal nutritional status, while mean protein was in close level to another group, mean energy intake, carbohydrate, fat, pulp, and water consumption were higher and this difference was statistically significant ($p<0.05$). In a study evaluating the nutrient consumption of individuals with a risk of malnutrition (n=190), it was determined that male intake average daily 1852 kcal of energy, 60.4 g of protein, 195 g of carbohydrate, 13.8 g of pulp, 230.9 mg of cholesterol, and 1747 kcal of energy for female, 58.8 g of protein, 176.3 g of carbohydrate, 12.9 g of pulp and 208.8 mg of cholesterol. It was determined that all individuals intake energy from 13.3% of proteins, 39.9% of carbohydrates and 45.8% of fats (176). In another study, the relationship between energy and nutrient values in 900 elder individuals who were classified according to MNA results were examined. According to the results of the study, high malnutrition rate among individuals is associated with female gender, increased age, low BMI, high comorbidity and low cognitive function. In this study, individuals with malnutrition and individuals with malnutrition risk intake insufficient daily energy, protein, carbohydrate, fiber, fat, vitamin B1, C, E, A, D, folate, calcium, iron and zinc compared to individuals with normal nutrition and this was found to be statistically significant (189).

5.6 Food Intake

Healthy nutrition is based on a variety of foods and it is needed to intake into the body with the nutrients of energy and nutrients needed daily. When planning meals, diversity should be provided by selecting different foods from each group (meat and similar foods, dairy products, vegetables and fruits, bread and other grains) (190). In this study, the frequency of individuals consuming basic nutrients was investigated. Accordingly, the consumption of nutrients in the basic food groups was evaluated as daily, 1-2 times a week, 3-4 times a week, 5-6 times a week, once in 15 days and once / monthly consumption frequencies.

Dairy products are a good resource for the repair of tissues in old age, for the creation of new tissues and for the preservation of the health of bone tissue. Therefore, it is recommended that the elder individuals consume dairy products every day. The recommended amount to be consumed from this group of foods is 600 grams in order to provide the daily calcium requirement (190). In our study, 21.9% of elder people consumed milk 3-5 times a week and 35.3% did not consume milk. In both groups, the majority of patients consume 3-5 times a week and 19.5% of all patients consume yogurt every day. 79.1% of all patients consume cheese every day. Male's consumption of dairy group nutrients was found as 35.75 g of milk, 90.0 g of yogurt and 25.90 g of cheese. Milk, yogurt and cheese consumption of female were found as 35.75 g, 90.0 g, and 25.90 g respectively. According to Turkey's Health and Nutrition Survey-2010 results, in the 65-74 age group, the average daily consumption of milk and dairy products was 197.3 g in male and 136.2 g in female. In individuals aged 75 and above, the average daily consumption of these foods is 169.3 g in male and 148.5 g in female (191).

The meat group is a source of good quality protein and is rich in iron. Meat, chicken, fish, eggs, legume, oily seeds are included in this group (190). The most preferred frequency for the eggs in our study was 3-5 times a week, and it was observed that those who consumed eggs were more frequent were male (64.3% for male, 55.9% for female). Male consumed an average of 31.97±15.12 g of eggs per day, while the female consumed 27.92±12.82 g of eggs. The recommended consumption for eggs is 2. 5 servings per week (4-5 pieces) (133). The amounts consumed by the patients are sufficient. It is seen that the most preferred frequency for red meat is 1-2 times a week in both groups, and the rate of those consuming red meat is higher are male. The most

preferred frequency for white meat consumption was 1 to 2 times per week, such as red meat. Male consumes red meat 27.84±17.20 g average per day, chicken meat 38.40±21.29 g an average per day and female consumes red meat 27.04±14.36 g per day and chicken meat 33.39±18.50 g per day. Low consumption of red meat every day and/or 5-6 times per week suggests that patients think that these foods are high in saturated fats and cholesterol contents and they do not consume these nutrients, however, it is considered that due to the same low consumption rates of white meat could be arisen from economic reasons, chewing-swallowing difficulties, and other various reasons. It is recommended that the elder people eat 2 portion of fish per week due to it contains PUFA (especially omega-3 fatty acids) (133). Fifty point seven percent of all individuals consume fish meat 1-2 times a month, therefore fish consumption is insufficient. Fifty one point six percent of all individuals consume legume 1-2 times a month and 47% of them consume it 1-2 times a week. Male consumed an average of 36.99±23.75 g of legume per day, while the female consumed 36.48±26.37 g of legume. Consumed amounts of legume are not sufficient. Elder patients need to include more the legumes in their diet. Foods such as hazelnuts, walnuts, almonds, and sesame are called nut/oilseed. These foods are rich in group B vitamins, minerals, fat, and protein. Although they have a high-fat content, they do not contain cholesterol because they are of vegetable origin. Hazelnut is rich in monounsaturated fatty acids, walnut is rich in monounsaturated fatty acids with n-3 fatty acids. For a healthy, adequate and balanced diet, the daily amount should be 30 pieces (30 g, a handful) for hazelnuts or 4 pieces (30 g) for walnuts (133). In the study, 30.2% of all individuals consume oily seeds 1-2 times a week, 20% of them consume it 1-2 times a month. It is seen that the male consume more it more. It was determined that male consume 7.59±7.11 g and female consume 7.84±7.64 g of oily seed average per day.

Vegetables and fruits are high nutritional value due to folic acid, beta carotene, E, C, B2 vitamin, calcium, potassium, iron, magnesium, fiber, and other antioxidant compounds. A minimum of 5 servings (over 400 grams) of fruits and vegetables per day is recommended. At least 2 portions of fruits and vegetables consumed per day should be green leafy vegetables or citrus fruits such as oranges, lemons or tomatoes (190). According to our study, it was found that the rate of female consuming green leafy vegetables 3 to 5 times a week was higher than that male (41.4%, 31.4% respectively). The most preferred frequency for other vegetables was in all individuals (51.6% of them) every day, and it was observed that those who consumed vegetables were more frequent than female are male (53.1%, 48.6% respectively). Sixty percent of all individuals

consume fruit 3-5 times a week and 37.2% of them consume it every day. The percentage of female consuming fruit every day (40.7%) is higher than male (30%). All elder individuals consumed 125.33±60.19 g vegetables and 129.20±64.92 g fruit in a day. The amounts consumed are not sufficient compared to the recommended. Some vitamin-mineral deficiencies seen in the elder people may be caused by insufficient vegetable and fruit consumption.

Grains are the main food group in Turkish society and the most consumed grain product is bread. This study supports this information. Both male and female patients reported that they consume bread every day. Daily white bread consumption (113.63±74.34 g in male, 89.07±64.32 g in female) is higher in both sexes than whole-wheat bread bread consumption (61.22±77.91 g in male, 58.73±69.05 g in female) . The most preferred consumption frequency for bulgur and pasta is 1-2 times per month (55.4% and 48.4%, respectively). While the rate of male and female who consume rice is very close, 54.4% of all patients consume rice 1-2 times a week. Average daily bulgur, pasta and rice consumption values of all individuals are 9.55±21.75 g, 31.99±23.73 g, 34.23±21.20 g respectively. Recommended daily grain group consumption is 200 g (5 thin slices of bread and 1 serving rice/pasta/1 bowl of a soup/1 small piece of borek). Grains are rich in B group of vitamins other than vitamin B12 and especially the best source of vitamin B1 (thiamine). These vitamins are mostly found in the shell and extract of the grains. For this reason, there may be some losses in other B group vitamins, especially vitamin B1, during the separation of the shell and its extract. Therefore full grain products are recommended (190). The amount of foods consumed in the grain group is close to sufficient levels. Individuals in the study intake a daily average amount of vitamin B1 is lower than the needed and it is thought that the reason may be low consumption of whole grain products.

Fat and sugar consumption frequencies of the patients were evaluated. Fifty nine point one percent of all individuals consumed olives every day, 45.6% of them consumed olive oil 3-5 times a week. In this study, it is seen that the most commonly used type of fat is oil (sunflower oil, corn oil) and 76.3% of all patients consume these. While 43.7% of all patients do not consume butter, 18.6% of them consume it every day. Twenty four point two percent of individuals consume margarine 1-2 times a week, 14.4% of them consume it 3-5 times a week and 37.2% consume it never. While 50.2% of all patients consume sugar every day, 15.3% of them never consume it. Glucose is easily transformed

into energy, which increases blood sugar quickly. Its energy value is high, it is recommended to reduce consumption of these (133).

In a study conducted by Fernandez-Barres et al. (176), the food consumption of individuals with malnutrition risk (n = 190) was investigated. According to results of the study, female consume 286.5 mL of milk, 9.5 g of cheese, 52.4 g of egg, 95.3 g of vegetable, 211.5 g of fruit, 106.9 g of grain and 30.3 g of sugar average a day and male consume 256.3 mL of milk, 85.5 g of yogurt, 10 g of cheese, 80.2 g of meat, 20.4 g of egg, 93.7 g of vegetable, 231.6 g of fruit, 107.9 g of grain and 38.3 g sugar average a day.

Individuals who participated in our study were evaluated for the consumption of beverages and it was determined that most individuals consumed tea. The most preferred consumption frequency for tea consumption is every day and coffee consumption is 3-5 times a week. Eighty-eight point six% of male and 91% of female drink tea every day. Male drink 236.36±110.63 mL tea average per day and female drink it 218.12±103.07 mL average per day. In a study conducted, the daily average amount of tea that individuals drink is 4.72±3.02 of teacup and the rate of those who drink ≥7 of a cup a day is 27.3%. The percentage of those who drink Turkish coffee is 40.9%, 27.3% of them are rare, and 9.1% of them drink coffee once a week (163). Older people may like to drink tea-coffee twice or three times a day. However, avoiding excessive consumption of tea and coffee and should be preferred to drink herbal teas, fresh fruit juices, milk, and ayran. Milk is a good drink to meet the liquid and calcium needs of elder people. Caffeinated beverages such as coffee and tea should be consumed moderately (133).

5.7. Energy and nutrient intake

The daily energy and nutrient intake of the individuals in our study were evaluated and compared with the different reference intake levels. The average daily energy intake of individuals was 1818.1±296.9 kcal for male, and 1647.8±215.1 for female. Energy is obtained from 15.4±2.71% protein for male, from 46.7±6.1% carbohydrates, and from 37.4±5.7% fat. In female, these rates are 15.1±3.0% for protein, 45.3±6.2% for carbohydrate, 39.4±5.8% for fat, respectively. When the intake amounts of energy and nutrients of individuals are examined, it is seen that the ratio of energy from protein is very close to the recommended levels (12-20%); the ratio from carbohydrate is less than

recommended levels (50-60%) and the ratio from the fat is more than recommended (25-30%). The daily amounts of cholesterol taken by all individuals are higher than the requirements of RDA and Turkey Dietary Guidelines reference values. It is known that reducing dietary fat, intake of mostly monounsaturated fats, preferring foods with omega-3 fat sources and decreasing saturated fats can reduce vascular anomalies and chronic diseases. Daily fiber intake levels of individuals close to the reference levels need to meet in Nutrition Guide Special to Turkey. The level of intake is higher in females than in males, and this difference is statistically significant ($p<0.05$).

According to data of Turkey Nutrition and Health Survey 2010, In the age group of 65-74, the average daily average of male in across Turkey was 1705 kcal and female was 1409 kcal. In the age group of 75 and above, the average daily intake of 1606 kcal energy for men and 1223 kcal energy for women. The ratio of energy from carbohydrate is 52.6% in male, 53.0% in female in the age group of 65-74, and 52.8% in male and 52.7% in female in the age group of 75 years and above. The ratio of energy from protein is 13.8% in male, 13.50% in female in the age group of 65-74, and 13.2% in male and 13.4% in female in the age group of 75 years and above. The ratio of energy from fat is 33.5% in male, 33.5% in female in the age group of 65-74, and 33.9% in male and 33.9% in female in the age group of 75 years and above (191). In a study conducted in Northern Cyprus, the average energy intake of individuals was found to be 1960.4±512.9 kcal in male and 1523.6±352.1 kcal in female (162). In a study conducted by Tieland et al. (192), it was found that 15.3±3.2% of the energy in males and 16.5 ± 3.5% of the energy in females living in the community were met from the protein. In another study, the mean BMI of the individuals was 23.5±4.61, and the male older people daily energy intake 1415±376.5 kcal and the female individuals intake 1277±419 kcal energy. All individuals in the study intake an average of 36±11.8 g protein (10.5-11% of energy) (193).

Vitamins and minerals are nutrients that maintain their importance for human health in every period of life. In our study, it was found that some vitamins and minerals intake were less than recommended. Calcium absorption in the elder people is reduced. Elderly people who are bed-dependent or wear over-covered clothes may not sufficiently benefit from the sun's rays and the synthesis of vitamin D in the skin and its activation in the kidneys are reduced. This reduces the absorption and use of calcium in the body and prepares the ground for the development of osteoporosis. This may lead to fallings and fractures in the elderly (194). In this study, the incidence of falls, fractures or cracks is

higher in female (37.2%) than male (24.3%). If calcium deficiency is not removed, this rate may increase. For male and female above the age of 65, intake of 1200 mg of calcium per day is recommended by RDA and 950 mg of calcium per day for is recommended by Nutrition Guide Special to Turkey. In this study, male consumed 672.8±198.4 mg calcium and female consumed 639.3±189.3 mg calcium with foods and these intake levels were insufficient by the requirement. In addition, the phosphorus intake of individuals was found to be very high. The male intake phosphorous 204.7% and female intake it 186.5% of RDA (Table 4.23). This negatively affects the absorption of calcium, which makes inadequate intake more important. Magnesium deficiency in the elder people creates a risk for health. Magnesium is found in the structure of more than 300 enzymes. It is a mineral that provides continuity of muscle and nerve cells and is in the structure of bones. In its deficiency; poor bone structure, irregular heartbeat, nausea, weakness, depression, and confusion can be seen (195). In our study, daily intake magnesium with foods is 264.9±102.4 mg in male and 242.8±70.8 mg in female and these intake levels were insufficient by the requirement. Abnormal (low or high) serum potassium levels are known to trigger cardiac arrhythmia, hypertension, stroke, myocardial ischemia and sudden cardiac death as it predominantly affects the cardiovascular system (196). In our study, it was found that the average daily potassium intake of the individuals was far below than requirement.

The vitamins taken under the recommendation are B1, B6, B12, C and folic acid. There is a strong relationship between low folate, vitamin B status and hyperhomocysteinemia. Hypomethylation caused by low vitamin B causes to an increase in homocysteine levels contributing to the pathophysiology of the disease through vascular and direct neurotoxic mechanisms and has been shown it establishes a ground for the development of atherosclerosis (197). In this study, according to the nutrition guidelines specific to Turkey, male meet their 87.5% of needs for vitamin B12 , 66.6% of the vitamin B1, 70.5% of the vitamin B6, 90.9% of the folate and according to RDA, these rates are 145.8 %, 66.6%, 70.5%, 75%, respectively. In this study, according to the nutrition guidelines specific to Turkey, female meet their 87.5% of needs for vitamin B12, 63.6% of the vitamin B1, 73.3% of the vitamin B6, 82.9% of the folate and according to RDA, these rates are 145.8 %, 63.6%, 73.3%, 67.8%, respectively (Table 4.23). Vitamin C is probably involved in the maintenance of endothelial function due to its antioxidant effects and its effects on collagen. Vitamin C is effective in increasing the gastrointestinal

absorption of iron and plays an important role in the maintenance of periodontal health in the aging process and in the elderly (198). In our study, individuals take vitamin C at levels close to the requirement. The percentage of male (81.1%) was lower compared to female (97.7%) only according to nutrition guidelines specific to Turkey. The daily amount of iron taken by individuals meets the requirements according to both reference values.

It is known that seasonal changes affect the emotional state, appetite (hormonal status), seasonal food production (especially fruits and vegetables), food costs and hence people's food consumption. In a study conducted by Ersoy et al. (199), they investigated the effects of seasonal changes on nutrition of elder individuals. According to the results of the study, the consumption of fruits, fats, eggs, and bread in male has been changed as seasonal ($p<0.05$). In the winter months, daily energy intake was higher in male (557 kcal) than in female (330 kcal) in other seasons ($p<0.05$). In addition, carbohydrates, vegetable protein, n-3 fatty acid, and sodium intake increased in winter and n-6 / n-3 ratio increased in male during the summer ($p<0.05$). It was found that intake of vitamin C, iron and zinc in winter and cholesterol, retinol, vitamin D and niacin intake in autumn were higher than other seasons ($p<0.05$).

As a result, in our study, the difference between genders in terms of daily intake of energy, protein, carbohydrates, pulp, vitamin B1, B2, B6, C, total sodium, phosphorus and zinc obtained by food consumption record of individuals was found significant ($p<0.05$). It was not found a significant difference in terms of other nutrients ($p>0.05$). In our study, the intakes of vitamin B1, B6, folate, potassium, calcium, and magnesium in both genders are below the requirement according to RDA. According to Turkey Dietary Guidelines, intakes of vitamin B12 (87.5%), B1 (66.6%), B6 (70.5%), C (81,1%), potassium (46.2%), calcium (70.8%) and magnesium (75.6%) of male are under the requirement. Intakes of vitamin B12 (87.5%), B1 (63.6%), B6 (73.3%), C (82,2%), potassium (43.4%), calcium (67.2%) and magnesium (80.9%) of female are under the requirement. (Table 4.23). In a study conducted by Fernandez-Barres et. al. (176), the percentage of micronutrients taken daily by elder individuals according to RDA were examined and vitamin A, B1, B3, B6, E, folate, and calcium were found to be insufficient.

Care should be taken to consume a sufficient amount of nutrients from each of the four essential nutrients groups and to ensure a variety of nutrients for adequate and

balanced nutrition in old age period. Low-fat or non-fat milk yogurt and cheese from foods with a high calcium content, at least 5 servings of vegetables and fruits per day, legumes for pulp need, bread varieties such as rye, oats and whole-wheat bread instead of white bread should be consumed. Olive oil and other vegetable oils should be preferred instead of fats such as margarine, butter, and lard. White meat (chicken, turkey) and fish should be consumed instead of red meat. Oily seeds should be consumed in recommended amounts. Consumption of sugar, sugared foods and dough should be limited. In this period, it is useful to increase fluid consumption. At the same time, in order to organize sporting activities and sports fields suitable for the elder people, and to ensure their motivation in this regard, it is thought that the local administrations, associations, organizations, etc. that work towards the elder people should develop the project and encourage them.

As a result, the basic strategy to keep elder adults healthy is to prevent chronic disease and decrease related complications including malnutrition. Nutrition is an interchangeable factor that affects the incidence and has an important role in the quality of life, as well as the progression of chronic diseases. The elderly are particularly sensitive to malnutrition when they suffer from chronic mental or physical disease. Therefore, they should be screened for malnutrition risk and have an appropriate care plan. Where there is significant malnutrition, there is clear evidence of the benefit of nutritional support. There is evidence that good nutrition and even the use of vitamins and mineral supplements may have an important preventive role in maintaining health and quality of life in elder people.

Nutrition screening is the first step in identifying elder people who need nutritional support. In order to identify those who need nutritional support, nutritional screening should be made as a routine for all elder adults. Although it is important what nutritional intervention is most effective to prevent or treat malnutrition, this study clearly shows that it is important to identify these individuals primarily. Consequently, this study found that people with a risk of malnutrition are relatively common, even in geriatric outpatients. Also, these results may support further studies to create effective interventions against malnutrition in elder individuals. The next step after screening the nutritional status of older people is the deeper evaluation of nutritional status and diet. Male older adults intake insufficient energy, protein, vitamins, and minerals. Nutritional education programs should be developed at national and state levels targeting healthy and

functionally independent elderly people to support dietary changes and information transfer. As a result of this study, dietary patterns can be used as a guide to educate elder people and to change eating behavior. Emphasis should be made on increasing nutrient-intensive nutrients and improving overall nutritional quality.

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7. APPENDICES

Appx 1. Ethical Approval

T.C. YEDİTEPE ÜNİVERSİTESİ

Sayı : 37068608-6100-15-1480
Konu: Klinik Araştırmalar
Etik kurul Başvurusu hk.

19/04/2018

İlgili Makama (Pelin Cin)

Yeditepe Üniversitesi Aile Hekimliği Anabilim Dalı Doç. Dr. Özlem Tanrıöver'in sorumlu olduğu **"İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 Yaş ve Üzeri Bireylerin Beslenme Durumunun Değerlendirilmesi"** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (**1456** kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **18.04.2018** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KAEK Karar No: 840**).

Prof. Dr. Turgay ÇELİK
Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurulu Başkanı

Yeditepe Üniversitesi 26 Ağustos Yerleşimi, İnönü Mahallesi Kayışdağı Caddesi 34755 Ataşehir / İstanbul
T. 0216 578 00 00 www.yeditepe.edu.tr F. 0216 578 02 99

Appx 2. Research Permit

26/03/2018

T.C.
YEDİTEPE ÜNİVERSİTESİ

KLİNİK ARAŞTIRMALAR ETİK KURUL BAŞKANLIĞI'NA

Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Beslenme ve Diyetetik Anabilim Dalı öğrencisi Pelin Cin'in "İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 Yaş ve Üzeri Bireylerin Beslenme Durumunun Değerlendirilmesi" başlıklı çalışmayı bölümümüzde yapması uygundur.

İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi
İç Hastalıkları Anabilim Dalı
Geriatri Bilim Dalı Başkanı
Prof. Dr. Deniz Suna ERDİNÇLER

Appx 3. Participant Informed Consent Form

Çalışma Başlığı: İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 yaş ve üzeri Bireylerin Beslenme Durumlarının Değerlendirilmesi

Katılımcının Adı – Soyadı:

Sayın Katılımcı,

'İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 yaş ve üzeri Bireylerin Beslenme Durumlarının Değerlendirilmesi' başlıklı bir araştırma çalışması yürütmekteyiz. Bu çalışmanın amacı; Geriatri Polikliniği'ne ayaktan başvuran 65 yaş ve üzeri bireylerde beslenme durumunun saptanmasında kullanılacak olan Mini Nütrisyonel Değerlendirme (MNA) uzun form tarama aracı ile malnütrisyon risk taraması yapmaktır. Aynı zamanda, beslenme alışkanlıkları ve besin tüketim durumunu değerlendirme formu, 24 saatlik besin tüketim kaydı, besin tüketim sıklığı anketi ve antropometrik ölçümlerin kaydı tutularak elde edilen tüm verilerin kendi içerisinde tutarlılığını karşılaştırmaktır.

Bu araştırma için size herhangi bir tedavi uygulanmayacak ve sizden herhangi bir tetkik istenmeyecek, herhangi bir örnek numune alınmayacaktır. Geriatri Polikliniği'nde yapılan rutin değerlendirmeler sonrasında sizlerin antropometrik ölçümleri (vücut ağırlığı, boy uzunluğu, Beden Kütle İndeksi (BKI), üst orta kol çevresi, bel ve kalça çevresi, baldır çevresi) alındıktan sonra yüz yüze görüşülerek tanımlayıcı bilgilerinizi, sağlıklı yaşam biçimi alışkanlıklarınızı öğrenmek için anket uygulanacaktır. Ardından, besin alımınızı değerlendirmek amacıyla 24 saatlik geriye dönük besin tüketim kaydı ve besin tüketim sıklığı formunu detaylı bir şekilde kaydetmek için tükettiğiniz besinlerin miktarları ile ilgili bilgiler sorgulanacaktır ve beslenme durumu riskini değerlendirmek amacıyla hazırlanmış formların doldurulması istenilecektir.

Araştırmaya katılması beklenen tahmini gönüllü sayısı 200 kişidir. Bu araştırma sizin için yeni bir risk yaratmamaktadır ve takip gerektirmemektedir. Bu çalışmaya katılmanız durumunda bilime ve tıbba katkıda bulunmuş olacaksınız. Bu araştırmaya gönüllü olarak katılımınız ile herhangi bir klinik yarar sağlayamamanız durumunda bilgilendirileceksiniz.

Bu çalışmaya katılmanız durumunda tek sorumluluğunuz araştırmacılar ile yapacağınız görüşmede uygulanacak olan çalışmaya özgü anket ve besin tüketim formlarını özenli bir şekilde doldurmanız ve antropometrik ölçüm sırasında istenilen pozisyonu yerine getirmenizdir.

Araştırma konusuyla, işleyiş süreciyle ve araştırmaya katılmaya devam etme isteğinizi etkileyebilecek yeni bilgiler elde edildiğinde zamanında bilgilendirileceksiniz.

Çalışmaya katılmanız tamamen gönüllülük esasına dayanmaktadır ve katılmayı reddetme hakkına sahipsinizdir. Herhangi bir cezaya veya yaptırıma maruz kalmaksızın ve hiçbir hakkınızı kaybetmeksizin, istediğiniz anda araştırmacıya bildirerek çalışmadan çekilebilirsiniz ya da araştırmacı tarafından gerek görüldüğü takdirde araştırma dışı bırakılabilirsiniz.

İmza:

Araştırmayı kabul etmemeniz veya herhangi bir nedenle çalışma programından çıkarılmanız durumunda İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi'nden aldığınız hizmet sürecinde bir aksama olmayacaktır. Araştırma için sizden veya bağlı olduğunuz sosyal güvenlik kuruluşundan hiçbir ücret istenmeyecek ve ayrıca size de herhangi bir ödeme yapılmayacaktır.

Size ait tüm tıbbi ve kimlik bilgileri, araştırma yayınlansa bile kesinlikle çok gizli tutulacak, hiçbir şekilde kamuoyuna açıklanmayacaktır. Araştırmanın izleyicileri, yoklama yapanlar, etik kurullar ve resmi makamlar gerektiğinde tıbbi bilgilerinize ulaşabilir ancak bu bilgiler gizli tutulacaktır. Yazılı bilgilendirilmiş gönüllü olur formunu imzalayarak, bu erişime izin vermiş olacaksınız.

Araştırma, haklarınız veya araştırmayla ilgili herhangi bir olumsuz olay hakkında daha fazla bilgi edinmek istediğinizde, çalışmanın yürütücüsü Pelin Cin'e ait 0537 714 44 25 numaralı telefondan günün her saatinde bilgi alabilirsiniz.

Gösterdiğiniz işbirliğine teşekkür ederiz.

Gönüllünün:

"Bilgilendirilmiş gönüllü olur formundaki tüm açıklamaları okudum. Bana yukarıda konusu ve amacı belirtilen araştırma ile ilgili yazılı ve sözlü açıklama, aşağıda adı belirtilen hekim tarafından yapıldı. Araştırmaya gönüllü olarak katıldığımı, istediğim zaman gerekçeli veya gerekçesiz olarak araştırmadan ayrılabileceğimi biliyorum. Tıbbi bilgilerimin kullanılmasına izin veriyorum. Araştırmaya katılmayı kabul etmediğim takdirde, tedavimin aksatılmadan eksiksiz yapılacağını biliyorum. Söz konusu araştırmaya, hiçbir baskı ve zorlama olmaksızın kendi rızamla katılmayı kabul ediyorum."

Adı Soyadı: Telefon:
Tarih: İmza:

Açıklamaları yapan araştırıcının:

Adı Soyadı: Telefon:
Tarih: İmza:

Appx 4. Survey Form

İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği'ne Ayaktan Başvuran 65 yaş ve üzeri Bireylerin Beslenme Durumlarının Değerlendirilmesi Çalışması

İstanbul Üniversitesi-Cerrahpaşa Cerrahpaşa Tıp Fakültesi Hastanesi Geriatri Polikliniği rutin değerlendirmeler sonrasında çalışmamız için bireyler ile yüz yüze görüşülecektir. Bu görüşme esnasında demografik bilgilerinizi, sağlıklı yaşam biçimi alışkanlıklarınızı öğrenmek için aşağıdaki değerlendirme formu, besin tüketim kaydı ve besin tüketim sıklığı formu ve beslenme riski değerlendirilmesi amacıyla Mini Nütrisyonel Değerlendirme (MNA) uzun formu uygulanacaktır. Ayrıca, antropometrik ölçümler (vücut ağırlığı, boy uzunluğu, üst orta kol çevresi, bel ve kalça çevresi, baldır çevresi) de alınarak elde edilen veriler kaydedilecektir.

Elde edilen tüm veriler, kesinlikle çok gizli tutulacak, hiçbir şekilde kamuoyuna açıklanmayacaktır. Çalışmamıza katıldığınız için teşekkür ederiz.

Hasta Takip No: ……

Tarih: …… / …..... / ……..…

Adı ve Soyadı: ……..

I. DEMOGRAFİK ÖZELLİKLER

1. **Yaşı:** …….. (……. gün /……. ay /…….. yıl)
2. **Cinsiyeti**: 1. Erkek 2. Kadın
3. **Medeni Durumu:** 1. Evli 2. Bekar
4. **Eğitim Durumu:**
   1. Okuryazar değil
   2. Okuryazar
   3. İlköğretim
   4. Ortaöğrenim
   5. Lise ve dengi
   6. Üniversite/Y.lisans/Doktora
5. **Toplam Eğitim Süresi**: …… yıl
6. **Çocuk Sayısı: .....** **7. Mesleği:** ……
8. **Siz dahil hanede yaşayan toplam kişi sayısı:** …….

9. Yaşadığınız yer?

1- Kentsel (il merkezi) 2- Kırsal (köy veya ilçe merkezi)

10. Nerede ve kiminle birlikte yaşıyorsunuz?

1.Evde 2. Huzurevinde 3. Diğer …….

a. Eşi ile b. Eşi ve çocukları c. Çocukları ile

d. Tek başına e. Bakıcı ile birlikte

f. Diğer (belirtiniz) .....

11. Genellikle evde gıda alışverişinizi kim yapar?

1. Kendim 2. Eşim 3. Beraber 4. Çocuklarım 5. Yardımcımız

12. Yemeklerinizi kim pişiriyor ve hazırlıyor ?

1. Kendim 2. Eşim 3. Beraber 4. Çocuklarım 5. Yardımcımız 6. Huzurevi aşçısı

13. Daha önce yaşanmış kırık, çatlak, düşme hikâyeniz var mı?

1. Evet 2. Hayır

14. Evet ise ne zaman gerçekleşti? ..... ay önce …….. yıl önce

15. Son 6 ay içinde hiç hastaneye/sağlık kuruluşuna /doktora/ gittiniz mi? (Herhangi bir sağlık kontrolünden geçtiniz mi?)

1. Hayır, hiç gitmedim 2. Evet (..... kez)

16. Eğer gittiyseniz, neden?

1. Düzenli muayene için
2. Sağlık yakınmaları nedeni ile/tedavi için
3. Diğer (belirtiniz) .....

17. Hekim tarafından tanısı konmuş herhangi bir sağlık sorununuz var mı?

Hastalıklar	Evet	Hayır
Şişmanlık		
Kalp-damar hastalığı		
Diyabet		
Hipertansiyon		
Solunum sistemi hastalıkları (akciğer vb)		
Anemi Türü (işaretleyin): a) Demir b) B12 vitamini		
Artrit, gut, romatizmal hastalıklar		
Böbrek hastalıkları		
Sindirim Sistemi Hastalıkları (Karaciğer, safra kesesi vb)		
Kanser		
Kas İskelet Sistemi Problemleri (Osteoporoz, eklem ağrıları)		
Ruhsal Sorunlar (Depresyon)		
Diğer (yazınız):		

18. Hekim önerisiyle düzenli olarak kullandığınız ilaçların sayısı nedir?

.....

19. Herhangi bir hastalık nedeni ile diyet uyguluyor musunuz?

1. Evet 2. Hayır

20. Evet ise hangi hastalıklar için diyet uyguluyorsunuz?

Hastalık adı	
1. Yüksek tansiyon	
2. Kalp hastalığı	
3. Şeker hastalığı	
4. Böbrek hastalığı	
5. Şişmanlık	
6. Kanser	
7. Kemik erimesi	
8. Mide hastalığı (ülser vb)	
9. Yüksek kolesterol	
10. Diğer (belirtiniz)	

21. Diyeti öneren kişi/kurum?

1. Diyetisyen 2. Doktor 3. Diğer sağlık personeli
4. Gazete/dergi/televizyon 5. Arkadaş 6. Kendim
7. Diğer (belirtiniz) …….

22. Beslenmenizi etkileyecek düzeyde çiğneme-yutma güçlüğünüz var mı?

1. Evet 2. Hayır

23. Diş kayıplarınız var mı? (Eksik diş)

1. Evet 2. Evet, tam protez kullanıyorum 3. Hayır

24. Diş problemleriniz yemek yemenize engel oluyor mu?

a. Hayır
b. Evet ama sadece katı yiyeceklerde
c. Evet hemen hemen tüm yiyeceklerde

25. Sigara içiyor musunuz?

1. Evet içiyorum, kaç yıldır içiyorsunuz?.....yıl
2. İçiyordum bıraktım
3. Hayır hiç içmedim

26. Alkol tüketme alışkanlığınız var mı?

1. Hayır
2. Evet, yalnızca önemli günlerde (düğün, sünnet, kutlama vb.)
3. Evet, öğünlerde
4. Evet, yalnızca dışarıda yenilen yemeklerde
5. Diğer (belirtiniz) .....

27. Alkol kullanıyorsanız ne sıklıkta kullanırsınız?

1. Her gün 2. Haftada: ……... kez
3. Ayda: …….... kez 4. Yılda: …….... kez

II. BESLENME ALIŞKANLIKLARI

28. Günlük su tüketimi (su bardağı): ..... mL

29. Günlük öğün sayısı: ..... ana ..... ara

30. Ne sıklıkla ana öğün atlarsınız?

1. Her zaman 2. Bazen 3. Hiç

31. Öğün atlıyorsanız atlanan öğün/öğünleri belirtiniz?

1. Sabah 2. Öğle 3. Akşam

32. Öğün atlama nedeniniz nedir?

1. Geç kalktığım için 2. Canım istemiyor, iştahsızım
3. Kilo vermek için 4. Alışkanlığım yok
5. Yalnız yaşıyorum 6. Diğer (belirtiniz) ……

33. Öğün aralarında genelde hangi tür yiyecekleri tercih edersiniz?

1. Süt/yoğurt/peynir 2. Sandviç, tost, börek
3. Simit, poğaça vb. 4. Meyve-sebze
5. Kek, bisküvi, kurabiye vb. 6. Kuruyemiş/kuru meyve
7. Diğer (belirtiniz) ……

34. Ara öğünlerde hangi tür içecekleri tercih edersiniz?

1. Siyah Çay 2. Yeşil Çay 3. Bitki Çayı
4. Türk Kahvesi 5. Nescafe 6. Süt
7. Ayran 8. Kefir 9. Soda
10. Taze Sıkılmış Meyve Suyu 11. Gazlı İçecek
12. Diğer (belirtiniz)……

35. Genel olarak iştah durumunuz nasıldır?

1. İyi 2. Kötü 3. Normal

36. Yemeklerin tadına hiç bakmadan tuz ekler misiniz?

1. Daima/her zaman 2. Sıklıkla 3. Bazen
4. Nadiren 5. Hayır

37. Ne tür tuz kullanıyorsunuz?

1. Normal sofra tuzu (iyotsuz) 2. Diyet tuzu
3. İyotlu tuz 4. Kaya tuzu
5. Diğer (belirtiniz) .....

38. Vitamin- mineral ilaçları kullanıyor musunuz?

1. Evet 2. Hayır

39. Evet ise adı nedir?

1. B12 vitamini 2. Multivitamin-multimineral
3. Demir 4. D vitamini
5. Omega-3 6. Diğer (Belirtiniz: ……)

40. Yemeklerinizi genellikle kimlerle tüketiyorsunuz?

1.Tek başına 2. Eşimle 3. Ailemle
4. Bakıcı ile 5. Huzurevi sakinleriyle

III. FİZİKSEL AKTİVİTE DURUMU

41. Düzenli olarak herhangi bir aktivite/egzersiz yapıyor musunuz?

1. Evet 2. Hayır

42. Cevabınız "Evet" ise en sık hangi aktiviteyi yaparsınız?

1. Yürüyüş 2.Yüzme 3. Koşu
4. Bahçe işi 5. Elişi yapma 6. Torun bakma 7.Diğer (belirtiniz) ……..

43. Bu aktiviteyi ne sıklıkla yaparsınız?

1. Her gün 2. Haftada 1 kez 3. Haftada 2 kez
4. Haftada 3-4 kez 5. Haftada 5-6 kez 6. 15 günde bir
7. Ayda 1 kez

44. Bu aktiviteyi bir seferde ne kadar süre yaparsınız?

1. 30 dk'dan az 2. 30-45 dk 3. 45 dk'dan fazla

45. Fiziksel olarak sizi engelleyen bir durumunuz veya sakatlığınız var mı?

1. Hayır 2. Evet (……)

46. Günlük uyku süresi …… saat

IV. ANTROPOMETRİK ÖLÇÜMLER

1. **Vücut Ağırlığı**:……..….(kg)
2. **Boy Uzunluğu**:…….(cm)
3. **BMI**…….…..…..kg/m^2
4. **Üst Orta Kol Çevresi**:……. (cm)
5. **Baldır Çevresi**:……...…….….(cm)
6. **Bel Çevresi**:……..(cm)
7. **Kalça Çevresi**:……(cm)
8. **Bel/kalça Oranı**:……

V. BESİN TÜKETİM SIKLIĞI FORMU

BESİNLER	Her gün	Haftada 1-2	Haftada 3-5	15 günde 1	Ayda 1	Hiç	Miktar
Süt ve süt ürünleri							
Süt							
Kefir							
Ayran							
Yoğurt							
Peynir							
Kaşar peyniri							
Et, yumurta, kurubaklagil							
Yumurta							
Kırmızı et							
Beyaz etler							
Balık							
Kurubaklagiller							
Yağlı tohumlar							
Taze sebze-meyve							
Yeşil yapraklılar							
Diğer sebzeler							
Patates							
Turunçgiller							
Diğer meyveler							
Kuru meyveler							
Ekmek-Tahıllar							
Beyaz ekmek							
Kepekli ekmek							
Bulgur							
Makarna, erişte							
Pirinç							
Börek							
Kurabiye, bisküvi							
Yağ, Şeker, Tatlı							
Zeytin							
Zeytinyağı							
Ayçiçek, mısırözü							
Tereyağ							
Margarin							
Şeker							
Çikolata							
Bal,reçel,pekmez							
Hamur tatlıları							
Sütlü tatlılar							
İçecekler							
Hazır meyve suyu							
Kolalı içecekler							
Çay							
Kahve							
Maden suları							

VI. 24 SAATLİK BESİN TÜKETİM KAYDI

ÖĞÜN	Besin Adı-İçindekiler	Miktarı (g)	Artık (%)	Net Miktar (g)
SABAH *Saat:*				
KUŞLUK *Saat:*				
ÖĞLE *Saat:*				
İKİNDİ *Saat:*				
AKŞAM *Saat:*				
GECE *Saat:*				

Appx 5. MNA-Long Form

Soyad: Ad:

Cinsiyet: Yaş: Ağırlık, kg: Boy, cm: Tarih:

Aşağıdaki soruları kutulara uygun rakamları yazarak yanıtlayın. Yazdığınız rakamları toplayın. Eğer Tarama puanı 11 veya altında ise Malnutrisyon Gösterge Puanı'nı elde etmek için değerlendirmeye devam edin.

Tamara

A **Son üç ayda iştahsızlığa, sindirim sorunlarına, çiğneme veya yutma zorluklarına bağlı olarak besin alımında bir azalma oldu mu?**
0 = besin alımında şiddetli düşüş
1 = besin alımında orta derece düşüş
2 = besin alımında düşüş yok ☐

B **Son üç ay içindeki kilo kaybı durumu**
0 = 3 kg'dan fazla kilo kaybı
1 = Bilinmiyor
2 = 1-3 kg arasında kilo kaybı
3 = Kilo kaybı yok ☐

C **Hareketlilik**
0 = Yatak veya sandalyeye bağımlı
1 = Yataktan, sandalyeden kalkabiliyor ama evden dışarıya çıkamıyor
2 = Evden dışarı çıkabiliyor ☐

D **Son üç ayda psikolojik stres veya akut hastalık şikayeti oldu mu?**
0 = Evet 2 = Hayır ☐

E **Nöropsikolojik problemler**
0 = Ciddi bunama veya depresyon
1 = Hafif düzeyde bunama
2 = Hiçbir psikolojik problem yok ☐

F **Vücut Kitle İndeksi (VKİ) = (Vücut ağırlığı-kg) / (Boy'un metre)^2**
0 = VKİ 19'dan az (19 dahil değil)
1 = VKİ 19'la 21 arası (21 dahil değil)
2 = VKİ 21'le 23 arası (23 dahil değil)
3 = VKİ 23 ve üzeri ☐

Tarama puanı (tamamı en çok 14 puan) ☐☐

12-14 puan: Normal nütrisyonel durum
8-11 puan: Malnütrisyon riski altında
0-7 puan: Malnütrisyonlu

Daha kapsamlı bir değerlendirme için G-R sorularını cevaplayınız

Değerlendirme

G **Bağımsız yaşıyor (bakımevinde veya hastanede değil)**
1 = Evet 0 = Hayır ☐

H **Günde 3 adetten fazla reçeteli ilaç alma**
0 = Evet 1 = Hayır ☐

I **Bası yarası veya deri ülseri var**
0 = Evet 1 = Hayır ☐

J **Hasta günde kaç öğün tam yemek yiyor?**
0 = 1 öğün
1 = 2 öğün
2 = 3 öğün ☐

K **Protein alımı için seçilen besinler**
- Günde en az bir porsiyon süt ürünü (süt, peynir, yoğurt) tüketiyor Evet ☐ Hayır ☐
- Haftada iki veya daha fazla porsiyon kuru baklagil veya yumurta tüketiyor Evet ☐ Hayır ☐
- Her gün et, balık veya beyaz et tüketiyor Evet ☐ Hayır ☐

0.0 = Eğer evet sayısı 0 veya 1 ise
0.5 = Eğer evet sayısı 2 ise
1.0 = Eğer evet sayısı 3 ise ☐.☐

L **Her gün iki veya daha fazla porsiyon meyve veya sebze tüketiyor**
0 = Hayır 1 = Evet ☐

M **Her gün kaç bardak sıvı (su, meyve suyu, kahve, çay,süt, vb.) tüketiyor?**
0.0 = 3 bardaktan az
0.5 = 3-5 bardak
1.0 = 5 bardaktan fazla ☐.☐

N **Yemek yeme şekli nasıl?**
0 = Yardımsız yemek yiyemiyor
1 = Güçlükle kendi kendine yemek yiyebiliyor ama zorlanıyor
2 = Sorunsuz bir biçimde kendi kendine yiyor ☐

O **Beslenme durumu ile ilgili düşüncesi**
0 = Kötü beslendiğini düşünüyor
1 = Kararsız
2 = Kendisini hiçbir beslenme sorunu olmayan bir kişi olarak görüyor ☐

P **Aynı yaştaki kişilerle karşılaştırıldığında, sağlık durumunu nasıl değerlendiriyor?**
0.0 = İyi değil
0.5 = Bilmiyor
1.0 = İyi
2.0 = Çok iyi ☐.☐

Q **Kol çevresi (cm)**
0.0 = 21'den az
0.5 = 21-22
1.0 = 22 veya daha fazla ☐.☐

R **Baldır çevresi (cm)**
0 = 31'den az
1 = 31 veya daha fazla ☐

Değerlendirme (en fazla 16 puan) ☐☐.☐
Tarama puanı ☐☐.☐
Toplam değerlendirme (en fazla 30 puan) ☐☐.☐

Malnutrisyon Gösterge Puanı

24 to 30 puan	☐	Normal nütrisyonel durum
17 to 23.5 puan	☐	Malnütrisyon riski altında
17 puandan aşağı	☐	Malnütrisyonlu

8. CURRICULUM VITAE

Personal Information

Name	Pelin	**Surname**	Cin
Place of Birth	Istanbul	**Date of Birth**	05.06.1992
Nationality	Turkish	**Identity Number**	13385428734
E-mail	pelincin34@gmail.com	**Telephone**	05377144425

Education Background

Degree	School/Department	Graduation Year
Master	**Yeditepe University**	2019
Bachelor's	**Yakın Dogu University**	2015
Highschool	**Sisli Health Vocational High School**	2010

Foreign Languages	Level	Score (KPDS/UDS/IELTS/TOEFL)
English	Intermediate	-

Work Experience

Position	Institution	Period
Research Assistant	Istanbul Kultur University	2017-Continue

Computer Programs

Program	User Level
Microsoft Office	Advanced
Nutrition Data Systems (Bebis)	Advanced
SPSS	Advanced

Scientific Publications

Cin, P., Gezer, C. (2017). Citrus Fruits as a Functional Food and the Relation with Metabolic Syndrome. Journal of Food and Health Science, 3 (2): 49-58.