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The Importance of Nutrition and Preventing Malnutrition in Older Adults: A Literature Review and Informational Booklet

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THE IMPORTANCE OF NUTRITION AND PREVENTING MALNUTRITION IN OLDER
ADULTS:
A LITERATURE REVIEW AND INFORMATIONAL BOOKLET

An Undergraduate Honors Thesis
Submitted in Partial fulfillment of
University Honors Program Requirements
University of Nebraska-Lincoln

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April 12, 2021

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Abstract:

Over years of studying nutrition science and gerontology, there was very little information in classes that combined these two important topics. Older adults are often classified as those above the age of 65 years old. There is a growing number of older adults in the United States, which increases the need for information on how nutrition and aging are interlaced. As humans age, multiple factors can impact nutrition. Nutrition involves consuming the proper amount of nutrients to maintain body function. There are physiological, physical, socioeconomic and medication factors that can all influence nutrition status. It is important to be aware of these influences to prevent malnutrition, deficiencies or other negative impacts. Specific recommendations and how to overcome obstacles that may inhibit proper nutrition in older adults are discussed. A systematic review was performed to gather data. PubMed was the main database used. Additional data was found on various informational websites to supplement the data found on PubMed. The date restrictions were set between 2018 and 2020. A few articles were used before 2018 because the information was necessary to supplement the topics discussed. There are serious implications of malnutrition and vitamin deficiencies that can be prevented through the proper knowledge and awareness.

Key Words: “Nutrition” “Older Adults” “Malnutrition” “Informational Booklet”

What is Nutrition?

Nutrition is focused on eating a balanced diet for your body to receive the nutrients that it needs to function. The important components of the diet are fats, carbohydrates, proteins, fruits, vegetables, dairy, vitamins, minerals and water. These components can be broken down into categories of macronutrients and micronutrients. Fat, carbohydrates and proteins are classified as macronutrients. Macronutrients are needed in greater amounts daily. Fats can be divided into

different subcategories, but high fat-containing foods include margarine, butter, avocados, nuts and oils. Carbohydrates consist of foods such as grains, oats, fruits and vegetables.

Carbohydrates are broken down to provide the body's main source of energy, glucose. The final type of macronutrient is protein. Foods that are good sources of protein include beef, lamb, pork, eggs, and milk (Harvard Health Publishing, 2020).

Micronutrients are required in lower amounts than macronutrients but are still vital in maintaining healthy body function. The four categories of micronutrients are fat-soluble vitamins, water-soluble vitamins, trace minerals and microminerals. Vitamin C and B-complex vitamins are water-soluble, meaning they are not able to be stored in the body. The fat-soluble vitamins are vitamin A, D, E and K. These are stored in the liver or adipose tissue. Calcium, sodium, and potassium are a few examples of microminerals. Trace minerals are needed in lower amounts compared to microminerals. Examples of trace minerals include zinc, copper, iron, and manganese (Harvard Health Publishing, 2020).

Nutrition involves the biochemical reactions that occur between the human body and the food that is digested. Nutrition recommendations are generalized guidelines and may differ because each individual can digest and absorb nutrients differently. As humans age, multiple factors impact nutrition including changes in health, medications, socioeconomic status, and altered nutrition needs. If nutrition is negatively impacted, it can lead to malnutrition.

Why is Nutrition Important?

Good nutrition is an important factor in energy levels, weight and health condition management (Medline Plus, 2020). Nutrition also plays a role in treating, preventing and managing medical conditions. Research has found that improvement in diet can lead to improved health outcomes and a reduced number of healthcare visits (Downer, et al, 2020). Nutrition along

with genetics, lifestyle, ethnicity, and environment are risk factors for medical conditions.

Improper diet and nutrition can lead to a serious condition called malnutrition.

Malnutrition

Malnutrition is an imbalance of energy and nutrient intake, whether it be a deficiency or an excess of nutrients that negatively affects the body's shape, size, composition, or function.

There are multiple categories of malnutrition including an inadequate intake of calories, protein, vitamins and/or minerals (World Health Organization, 2020). Malnutrition not only occurs in underweight individuals but in adults of any weight, whose nutritional needs are not being met (Mangels, 2018). The American Society for Parenteral and Enteral Nutrition (ASPEN) states that malnutrition can be defined differently depending on the etiology of the condition. The three definitions are starvation-related, chronic disease-related and acute disease/injury-related malnutrition (White et al, 2012). Malnutrition leads to lower physical and mental function from the lack of intake or absorption of nutrients (Corish & Bardon, 2018).

Many older adults perceive their health as good or excellent, but they are still at risk of malnutrition (Mangels, 2018). Low food intake, which can be due to a variety of reasons, is the main cause of malnutrition in older adults (Clegg & Williams, 2018). There are several causes of malnutrition which include social, physical, psychological and economic factors that can put older adults at risk. Older adults can experience any of the ASPEN definitions of malnutrition, starvation-related, chronic disease-related, or acute disease/injury-related.

There are numerous implications of malnutrition. Malnutrition results from a reduction in an individual's intake or utilization of nutrients in the body, which decreases the body's ability to maintain and repair tissue. The inability of the body to maintain and repair tissue can increase the risk of pressure ulcers (Volkert, et al, 2019). Pressure ulcers, also known as bed sores or

decubitus ulcer, are areas of necrosis that occur over the bony points of the body in patients that have limited mobility. Diminished hydration is also a key factor in developing pressure ulcers. Malnutrition and dehydration lessen the body's ability to heal pressure ulcers. It is estimated that between 1 and 3 million people in the United States develop pressure ulcers each year. The healthcare cost in the United States for pressure ulcers is projected to be around \$1.6 billion. It is important to recognize and treat malnutrition for the patient to heal properly (Saghaleini, et al, 2018).

Falls are another risk of poor nutrition due to decreased bone health associated with the lack of nutrients. A decrease in bone health often occurs with age, which I discuss in further detail in a later section. Falls can increase mortality risk, increase hospitalization rates, lengthen hospital stays and lead to higher health care costs (Smith, et al. 2020). Overall, falls can lead to a lower quality of life (Mangels, 2018).

Diagnosing Malnutrition

A gold-standard diagnostic criterion for malnutrition has not yet been agreed upon in the scientific community. Body Mass Index (BMI) is one factor that is commonly used as part of a diagnosis. The ASPEN consensus is one of the guidelines that can be followed in determining malnutrition. There is a list of six different parameters that indicate malnutrition, and two of the six parameters must be met to be considered a diagnosis for malnutrition. The six parameters are weight loss, loss of muscle mass, loss of subcutaneous fat, insufficient energy intake, localized or generalized accumulation of fluid and decreased handgrip strength. If any two of the parameters are diagnosed, then a nutrition assessment and care plan are recommended (White, et al, 2012).

Screening for malnutrition is uncommon even though about 50% of older adults are at risk of malnutrition (Smith, et al, 2020). There is a difference between malnutrition/ nutrition

screening and nutritional assessment. Malnutrition screening is done by a registered dietician, clinician or nursing staff and uses tools such as questionnaires, weight loss analyses and other malnutrition indicators. In comparison, nutritional assessment is a more detailed and specific evaluation of an individual's diet (Power, et al, 2018). Nutritional assessments are more time-consuming and costly compared to malnutrition screening. If an individual has been identified for risk of malnourishment there should be a complete nutritional assessment. (Volkert, et al, 2019).

Nutrition screening is vital for older adults because it can identify those who are malnourished or are at risk of malnutrition. Identifying malnutrition is the first step in establishing a healthier nutrition status. Screening is important for the prevention of other adverse outcomes of malnutrition, including declining physical health and increased length of hospital stays (Power, et al, 2018). Visual determination of malnutrition can be helpful but is not always accurate, other screening tools should be used as well. Currently, there is not one specific nutritional screening tool that has been agreed upon to be used for older adults. There are a variety of screening tool options. Most include BMI measurements with questions about weight loss, chronic conditions and typical food intake.

The Mini Nutritional Assessment Short Form (MNASF) is a typical nutritional screening tool. MNSAF consists of a six-question quiz that takes approximately five minutes to complete. A second tool is the Malnutrition Universal Screening Tool (MUST). MUST is a common tool used in the UK and includes the BMI assessment, questions about recent weight loss, and medical history/ conditions. The results determine whether individuals are at high, medium or low risk of malnutrition. The Geriatric Nutritional Risk Index (GNRI) was developed specifically for older adults. The equation used is: $GNRI = (1.489 \times \text{albumin (g/L)}) + (41.7 \times$

(weight/WLo)). WLo is the ideal weight and is determined using the equation $WLo = H - 100$ $((H-150/4)$ for men and $WLo = H - 100 ((H-150/2.5))$ for women. H is the height measured in cm. The scores indicate if the individual falls into a major risk, moderate risk, low risk or no risk group. The final nutrition screening tool looked at was the Simplified Nutritional Appetite Questionnaire (SNAQ). SNAQ is a four-question assessment based on appetite, satiety, taste and meal frequency. Individuals answer the questions based on a scale ranging from “very poor” to “very good” (Dent, et al, 2019).

Physical Impacts of Aging on Nutrition

Physical changes occur with age and can have an impact on nutrition. Physical changes include physiological, anatomical and functional changes. Physiological changes look at the internal functions and processes of the body. Anatomical change refers to changes in the structures of the body. Functional changes refer to mobility, activities of daily living (ADLs), and instrumental activities of daily living (IADLs). Physical changes include loss of muscle mass, chronic conditions, dentition, decreased senses and digestive tract changes. Many of these changes coexist and impact each individual differently.

Loss of muscle mass and increase in the percentage of body fat are tied to age. This can occur even though weight remains stable (Mangels, 2018). The resting energy expenditure (REE) for older adults is estimated to be around 20 kcal/kg body weight. REE is the number of calories the body burns in a state without movement. This number can vary depending on activity level. REE may decrease with age due to reduced muscle mass. Basal metabolic rate (BMR) is the minimum number of calories necessary for the body’s basic functioning. BMR is influenced by nutrition status and gender. Taking these factors into consideration, the energy requirements for an older adult with a BMI of 20 kg/m² and below is between 32 and 38 kcal/kg. Having a fever,

medications and inflammation can change energy requirements (Volkert, et al, 2018). Fewer calories may be needed for older adults due to lowered muscle mass, but the requirement of vitamins, protein and minerals remains the same (Mangels, 2018).

Atrophy of muscles and weakness from aging can limit a person's mobility, strength and function. The decreased functional movement and decline in overall health increase the risk of malnutrition (Clegg & Williams, 2018). Decreased muscle mass and strength make it more difficult to perform ADLs and IADLs. A decrease in IADLs such as shopping, preparing and eating food will negatively impact nutrition (Smith, et al. 2020). Decreased function also puts the older adult at increased risk for food poisoning and injuries because they are not able to properly use kitchen utensils (Clegg & Williams, 2018). Reduced muscle function is likely to decrease physical activity such as walking, golfing, tennis or other activities that keep older adults moving.

Chronic diseases such as diabetes, cancer, and heart disease as well as frailty all have increased likelihood with age (Clegg & Williams, 2018). Atrophy of muscles from growing old is a major contributor to these conditions. Frailty is a condition that affects primarily older adults that involve increased vulnerability to complications following a stressful situation. Sarcopenia is the progressive loss of skeletal muscle mass and function (Chan, et al, 2016). Frailty, sarcopenia and osteoporosis can contribute to the increased risk of falls in older adults. Falls can also result in an increased risk of infection, mortality and morbidity (Clegg & Williams, 2018). Poor nutrition will exacerbate these circumstances.

Dental problems can also impact nutrition. Conditions including periodontal disease, dry mouth and bleeding gums can impact an older adult's ability to swallow and eat. These changes often make eating less enjoyable (Smith, et al. 2020). It is reported that about 20% of older adults

age 65 and older do not have natural teeth. This causes problems in eating because issues with teeth, gums or poorly fitting dentures can limit food choices (Mangels, 2018).

Older adults can experience a loss of muscle mass, decreased sensation of thirst, low kidney function, and increased medication prescriptions which affect an individual's hydration status. Older adults can also have a reduced amount of body water as they age, which increases their risk for dehydration (Smith, et al. 2020). Older adults may avoid fluids in the evening to decrease the need to urinate at night. Avoiding fluids will increase their risk of dehydration. Hydration is important to maintain proper body function. Water helps to regulate body temperature, maintain the moisture of body tissues and remove waste products.

A decreased sense of taste and smell is possible with age. These factors can contribute to lowered appetite and thirst. The most commonly avoided food in these situations are meats, raw vegetables and whole fruits (Smith, et al. 2020). The change in senses can be caused by medication use, deteriorating gum and dental health, cell dysfunction, and/or chronic illness. A dislike of bitter or sour foods or drinks and a preference for sweets are common changes in taste with age (Mangels, 2018).

As a person ages, there is an increased risk of problems with absorption, secretion, motility and digestion. The inability to metabolize vitamins and minerals due to physiological changes can lead to a deficiency or toxicity. Older adults have a higher prevalence of atrophic gastritis, peptic ulcers and gastric ulcers because of their diminished healing mechanisms. The decreased ability to heal is due to weakened protection of the mucosal layer and reduced blood flow to gastric areas. Atrophic gastritis is caused by an *H. pylori* infection and leads to a loss of gastric mucosa glands. Loss of these glands impairs secretion of important stomach substances such as hydrochloric acid, intrinsic factor and pepsin. Lower acid secretion in the stomach can

lead to other complications including malabsorption of vitamin B12 and small intestinal bacteria overgrowth (SIBO) (Dumic, et al, 2019). Vitamin B12 requires intrinsic factor to be absorbed properly so if secretion is impacted it will lead to vitamin B12 deficiency (Ankar & Kumar, 2020).

Psychological Factors Effects on Nutrition

In addition to physiological factors, psychological factors play a role in nutrition. Different situations such as bereavement, isolation, depression, insomnia and dementia can alter food intake and can negatively impact nutrition status. These situations do not always occur with aging because everyone experiences a unique life process but are possible. Socioeconomic status is another nutrition and intake influencer that I will discuss later in this section.

Isolation or living alone can cause a decreased appetite and intake. When you live alone, most of the time you cook and eat alone which can cause loneliness. Bereavement occurs after a loss, often of a loved one or close friend. Bereavement, grief and loneliness can lead to depression. Depression is not uncommon in older adults. Weight loss or gain and change in appetite can be symptoms of depression. Poor nutrition can increase the risk of depression and depression can also increase the risk for malnutrition, so they are closely linked. When an individual has depression, they are unable to function normally in their daily life. They lose the motivation to buy, prepare and eat food. Depression can reduce appetite as well, which increases the risk for malnutrition because intake is decreased. Medications used to treat depression can also cause complications including nausea, diarrhea and anorexia which can have negative effects on nutrition (Mangels, 2018).

Insomnia is a sleep disorder classified as having difficulties falling asleep or staying asleep through the night. Following a study using a Mini Nutritional Assessment (MNA), it was

found that insomnia in older adults is closely associated with malnutrition. Independently, malnutrition and insomnia increase the risk for falls, cognitive impairment and depression. These conditions together further increase the risk. It is also suggested that when one condition is found, the patient should be evaluated for the other (Soysal, et al, 2019).

Weight loss can be an early symptom of depression or dementia. An individual with dementia can forget to eat and experience a loss of appetite. Wandering is also a symptom of dementia. Wandering burns calories, so if the patient is not receiving proper intake, they will lose weight. As dementia progresses, the ability to eat and feed oneself is decreased which puts individuals at high risk of malnutrition (Kimura, et al, 2019).

Economic and transportation issues lead to lower food accessibility (Smith, et al. 2020). Older adults with low or middle incomes sometimes have to choose between purchasing medications, housing and/or food. Oftentimes, the cheaper food is not as nutritious. Transportation can be another obstacle in eating a nutritious diet. Having to ride a bus can impact an older adult's food choices by limiting the number of groceries they buy. Older adults often consider convenience, taste and price when choosing food. When focusing on convenience, nutrition is not often also considered (Mangels, 2018). The prevalence of food insecurity in older adults in the United States is still a challenge even though the rates have been on a decline. 1 in 14 older adults reported food insecurity in 2018 (Ziliak & Gundersen, 2020).

Specific Nutritional Needs for Older Adults

Nutrition involves obtaining and absorbing the nutrients necessary for growth, development and maintenance. To maintain energy levels, both calorie and nutrient levels should be met. It is recommended, older adults focus on key nutrients: vitamin B12, vitamin D, minerals and dietary fiber (U.S. Department of Agriculture, n.d.). Foods with high nutrient levels and low

calories are ideal. A variety of fruits and vegetables, whole grains such as oatmeal and brown rice, milk and cheese fortified with vitamin D and calcium, protein from seafood, lean meats, eggs, poultry, nuts, and beans is recommended (Medline Plus, 2020).

The Food and Nutrition Board of the Institute of Medicine recommends that adults over the age of 50 get the majority of their vitamin B12 from supplements or fortified foods (Mangels, 2018). It may be difficult for older adults' digestive systems to absorb vitamin B12. Intake of vitamin B12 can be increased by consuming lean meat, seafood, and fortified cereals. Older adults should check with their providers to see if they suggest a vitamin B12 supplement (Klemm, 2020).

An increased amount of vitamin B6 is recommended for older adults (Mangels, 2018). Vitamin B6 is a water-soluble vitamin that is important in many different body functions, especially protein metabolism. The recommended intake for adults over the age of 51 is 1.7 mg for males and 1.5 mg for females. Vitamin B6 is abundant in fish, non-citrus fruits, potatoes and organ meats such as beef liver. Fortified cereals also have vitamin B6. Vitamin B6 deficiency is not very common. It more commonly occurs with kidney diseases, celiac disease, ulcerative colitis and Crohn's disease. Medications can also impact vitamin B6 levels (Office of Dietary Supplements, 2020).

Calcium is an important mineral in the body. It is recommended to increase the intake of calcium for older adults. Calcium plays a role in muscle contraction, heart pumping, signaling within the body, hormonal secretion, and structural support in bones and teeth. The daily recommendation for males age 51-70 is 1,000 mg and 1,200 mg for females. The recommendation is 1,200 mg per day for adults over 71 years old. Dairy products are a key source of calcium. Females aged 51-70 and both genders age 70 and older typically have calcium

intake that falls below the recommended daily requirement. Calcium supplements can be taken to reach daily recommended levels (Office of Dietary Supplements, 2020).

It is important to eat foods rich in fiber to maintain bowel health. Older adults may suffer from gastrointestinal issues such as diarrhea or constipation. A fibrous diet may help to normalize bowel movements (Volkert, et al, 2019). Fiber-rich foods also play an important role in heart health and lowering the risk of type 2 diabetes. Examples of fiber-rich food include whole grains, beans, peas, and many fruits and vegetables (Klemm, 2020). 25 grams is the recommended daily value for older adults (Volkert, et al, 2019).

Potassium is another important part of the diet. It is present in body tissues and helps to maintain cell function by regulating gradients and intracellular fluid volume. Good sources of potassium include dairy products, fruits, vegetables and beans (Klemm, 2020). 3,400 mg for males and 2,600 mg for females are the daily recommended values for adults over the age of 51. Potassium supplements are not often recommended due to concerns with the side effects of excess potassium. Hypokalemia, low potassium, is not common among people with normal functioning kidneys. It can also be a result of diarrhea as potassium is lost in the bowel movement (Office of Dietary Supplements, 2020).

Vitamin D recommendation is 600 IU/d for ages 61-70 and 800 IU/d for adults over the age of 70 (Office of Dietary Supplement, 2020). Vitamin D is important for the prevention of fractures and maintaining bone mineral density (Clegg & Williams, 2018). In order to maintain bone health, older adults require more calcium and vitamin D. The increased requirement can be met by a diet of calcium-rich foods and beverages. Examples include many dairy products such as yogurt, milk, fortified cereals, canned fish, and dark leafy green vegetables. Fatty fish such as salmon and eggs are also good sources of vitamin D. If the requirement is unable to be met

through the diet, a calcium supplement that also contains vitamin D is suggested (Office of Dietary Supplements, 2020).

Protein is considered to be the most satiating macronutrient, making you feel full. It has been found to not have that effect on many older adults. Protein is necessary for muscle mass, wound healing process, immunity, skin integrity, and illness recovery. Recommendation for protein levels for older adults is 1.0- to 1.2 g/kg body weight per day and it increases to 1.2. to 1.5 g/kg body weight per day for malnourished older adults or at risk of malnourishment (Clegg & Williams, 2018). Protein requirements may also be increased in older adults that suffer from inflammation, wounds and infections. (Volkert, et al, 2019).

As previously discussed, hydration is vital for the body to properly function. It is recommended that older adults drink 6-9 cups of fluids per day (CDC, 2020). The total can be obtained from various sources including water, milk, juices and coffee. Water is the preferred option as it contains zero calories and no sugar (Bhanu, et al, 2019).

Recommendations

MyPlate is a suggestion tool used to promote a balanced diet but does not give specific amounts to each group as it depends on the individual. It involves an image describing how much of your plate should consist of the five main food groups: grains, fruits, vegetables, protein and dairy. Fruits and vegetables are suggested to make up half of the plate. Grains and protein make up the other half, with grains taking up slightly more than protein (U.S. Department of Agricultural, n.d.).

There are many suggestions to help overcome obstacles that prevent older adults from obtaining proper nutrition. First, it is important to educate the patient, family and support network about the specific nutritional needs of that individual older adult. Knowing what foods

the older adult prefers is also helpful. This allows them to choose healthy foods that are appetizing. Provide resources such as reading materials or videos to inform them of healthier choices and if needed, refer them to food and nutrition programs. The older adult's dietary intake should be assessed and then adjusted as needed. Medications can impact nutrition so all medications should be reviewed, including vitamins and supplements (Mangels, 2018). Other general recommendations include continuing to be active, consume fortified foods, drink water or milk instead of sugary drinks. (U.S. Department of Agriculture, n.d.).

If an older adult lives alone, there are multiple struggles they could face. They may struggle with making meals for one person, have trouble getting around the house, are tired of eating alone, have difficulties with cooking, suffer from depression or have limited income. Home delivered meals from a service such as Meals on Wheels is one option (Mangels, 2018). Organizing a potluck with friends, family or neighbors is another suggestion that can help some of the obstacles such as loneliness and difficulties cooking (Medline Plus, 2020).

As previously discussed, older adults can have a change in their senses which can impact food choices. Adding spice, color and texture to foods and meals can help with the issue of decreased sense of taste and smell (Medline Plus, 2020). Medications can also alter appetite or food preferences. Talk to a provider to see if other medication options are available if the side effects impact nutrition intake. (Mangels, et al, 2018).

There are a wide variety of physical challenges that can occur with age. These changes in mobility, difficulty chewing or swallowing, trouble cooking or eating, or carrying groceries are common in older adults. Home assistance or hired help can assist with mobility and cooking challenges. Buying pre-sliced options such as apples is another suggestion. If they have troubles with swallowing, it should be addressed with a medical provider but drinking plenty of fluids

with meals can help ease the difficulty (Medline Plus, 2020). If an older adult struggles to carry heavy groceries, they may opt to get fewer items or choose lighter-weight prepackaged options. Finding a friend, family member or hired individual to assist at the store will allow the older adult to get the food they want and not settle for fewer or lighter items (Mangels, 2018).

Conclusion

Nutrition plays a key role in normal body functioning. A lack of proper nutrition can lead to malnutrition. Malnutrition has many serious side effects, especially for older adults. Aging is tied to physical changes, increased medications, psychological changes, changes in socioeconomic status and changes in nutritional needs. Older adults have many options to ensure proper nutrition to avoid malnutrition.

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