IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

Nutrition Decisive System for Old Age People

Mohd Jubair Mohd Ayaj Ansari, Sohil Noor Sheikh, Snehal W. Wasankar,
Dr. A. A. Khodaskar, A. P. Ghatol, Rachit Sharma, Abhishek Dudhe, Abhishek Taywade
SIPNA College of Engineering and Technology, Amravati

Abstract: *The process of aging is characterized by numerous changes in the body which has an overall negative effect on the health and lifestyle of elderly. Nutrition deserves special attention as an individual reaches old age. It plays a vital role in affecting the quality of life, including physical, mental and social health. The physiological decline in food intake is very common among older age and this result in nutritional deficiencies. These increased nutritional deficiencies are the major risk factors for certain chronic diseases and deteriorated age-related health. Thus, the adoption of nutrition decisive system can be a measure to tackle the current situation of nutritional deficiencies and promote a healthy lifestyle.*

"A proud and resourceful nation can no longer ask its older people to live in constant fear of a serious illness. We owe them the right of dignity in sickness as well as in health. Too many elderly people . . . skimp on food at a time when their health requires greater quantity, variety and balance in their diets."

John F. Kennedy..

Keywords: Aging, anorexia, nutritional deficiencies, supplementation, geriatric foods, healthy ageing, malnutrition, frailty, nutrient intake, nutritional status

I. INTRODUCTION

The world's population is ageing. Asia is one of the continents undergoing rapid demographic transition with an increase in the number of older persons, which is expected to triple by the year 2050 for the category of 80 years or above and to double for the category of 60 years or above since 2015.According to the United Nations report on the world ageing population, from 2015 to 2030 Asian countries such as China, Hong Kong, Vietnam, Malaysia, Singapore, and Indonesia would attain a higher ranking of the most aged population based on the projected percentage. Ageing is accompanied with a decline in functional ability and health. Thus, lifestyle and diet clearly play a crucial role in ageing. This trend has been particularly evident in more economically developed Asian countries in which migration from rural to urban areas is accompanied by a change in lifestyle and dietary habits. These trends have a significant impact on health, in view of the shift from primarily infectious diseases to non-communicable chronic diseases (NCDs) including hypertension, diabetes, cardiovascular or cerebrovascular disease, cancer, osteoporosis, and cognitive decline. Such a shift in the type of diseases coupled with the ageing of the population increases the burden on healthcare resources. Diet is one of the modifiable factors which may help to prevent health problems and improve quality of life later in life.

According to gerontologist, aging is regarded as biological phenomena marked by 'temporal continuity, heterogeneity on cellular, somatic and molecular level, and, the ability of being modulated'. Aging is a multidimensional process characterized by several physical, social and physiological alterations occurring in humans during the course of life. 'National Policy on Older Persons' defines 'elderly' as those people aged 60 years or above, but this age of senior citizens varies globally. If the proportion of people aged above 65 years reaches 7%, a country is said to be aging. Demographically, aging is an increase in the number of elderly (60+ years) in relation to the total population of the country over a specific period of time.

Older persons are particularly vulnerable to malnutrition. Moreover, attempts to provide them with adequate nutrition encounter many practical problems. First, their nutritional requirements are not well defined. Since both lean body mass and basal metabolic rate decline with age, an older person's energy requirement per kilogram of body weight is also reduced. The process of ageing also affects other nutrient needs. For example, while requirements for energy may be reduced, some data suggest that requirements for other essential nutrients may in fact rise in later life. There is thus an urgent need to review current recommended daily nutrient allowances for this group. There is also an increasing

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

demand worldwide for WHO guidelines which competent national authorities can use to address the nutritional needs of their growing elderly populations.

It is often thought that older people require less vitamins, minerals and protein than younger people; however, this is not the case.Requirements are actually much the same and can even be more, especially in times of illness. Older people need more protein thanyounger people.

II. NUTRITION CONSIDERATION FOR ELDERLY

Old age is characterized by changes in health and physiology which affects the nutrient needs of the older population. The diet in elderly fails to provide them with adequate nutrients needed to maintain optimum health and results in nutrient deficiencies and leads to the development of degenerative diseases. The elderly is usually at high risk of developing nutritional deficiencies that is either due to low dietary intake or impairment in the mechanism of absorption or failure to conversion to active forms (Table 1). Although energy needs decline with age, however the need for protein and certain nutrients increases in the normal functioning of the body. The deficiency of certain nutrients is known to affect cognitive functioning that is very common among the older population (Fig. 1). There are certain recommendations of nutrients for older people, which are described below:

2.1 Protein

The reduced daily food intake among elderly fails to provide them with recommended levels of protein. This insufficiency of protein intake results in loss of muscle mass which is defined as sarcopenia. About 30% of individuals aged 60 years and above are sarcopenic, while more than 50% individuals aged 80 years and older are estimated to be sarcopenic. This impaired protein turnover and inability of elderly to make balance between protein requirement and intake is known to adversely affect their health. Lower protein levels are not only associated with chronic muscle wasting, but also affects the bone health leading to functional loss and frailty. The elderly is recommended to ingest equal proportion of protein throughout the day, i.e. equal amounts during breakfast, lunch and dinner. Due to metabolic alterations during aging, the ability to produce muscle protein decreases drastically. Adequate intake of essential amino acids or protein is known to stimulate the synthesis of skeletal muscle protein rates. Study by Volpi et al. suggested that essential amino acid; particularly leucine has a stimulatory effect on the synthesis of muscle protein. However, this synthesis is impaired in elderly when the dietary intake of leucine is less than 3g. The threshold of 3g is achieved when approximately 25-30g of high-quality protein is ingested.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

However, new evidence has shown that this amount of protein intake is insufficient to maintain the health of the elderly. Older adults having acute or chronic diseases have higher demands for protein, which ranges between 1.2-1.5g/kg body weight/day. This higher demand for dietary protein than younger is due to impaired anabolic response to protein. Some longitudinal studies suggest 1g/kg per day protein intake is beneficial for maintaining positive protein status in the elderly population, whereas other studies suggest that people with protein intake of 1.3-1.73g/kg/ day has better health status as compared with those consuming 0.8g/kg/day. According to PROT-AGE study group, the diet of older individuals should contain approximately 25-30g protein per meal, out of which 2.5-2.8g should be contributed by leucine so as to maintain optimum protein anabolism. Thus, on an average total protein intake should be in the range of 1.0-1.2g/kg/day.

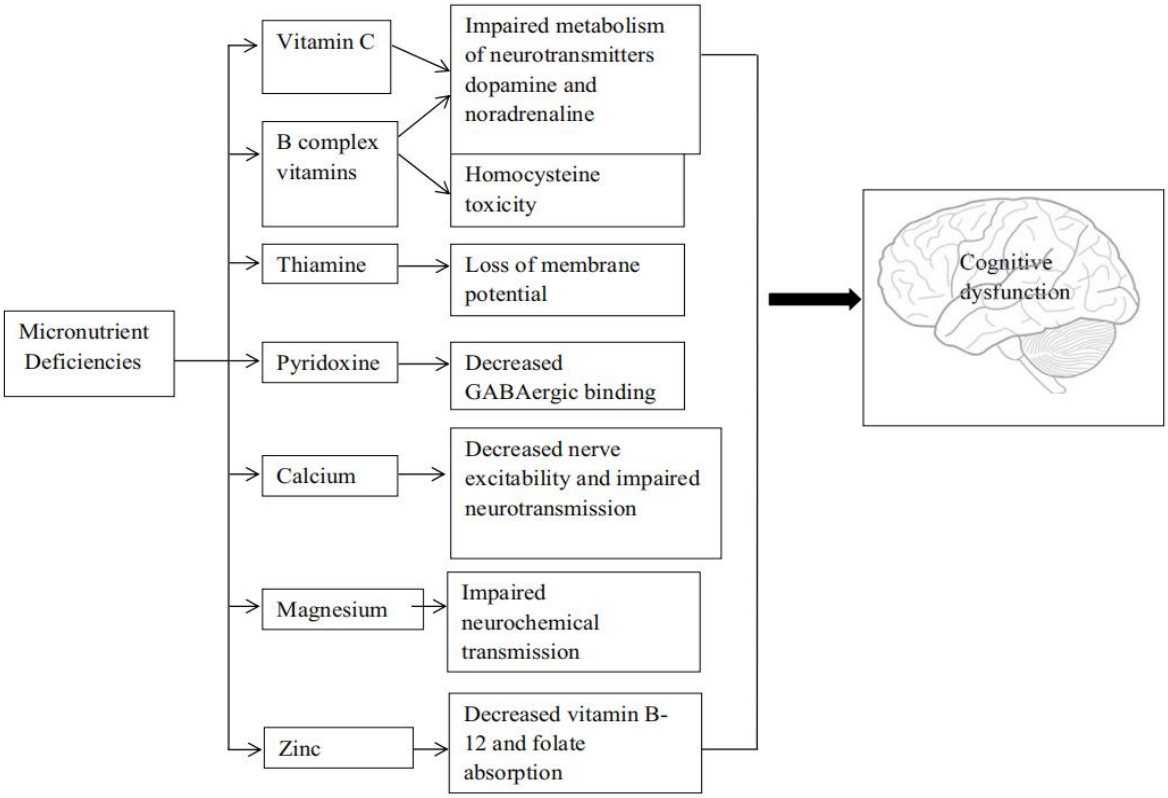

Fig No.1 Effect of micronutrients on cognitive performance

Table 1. Strategies to enhance the absorption of various nutrients in the body.

Nutrients	Role in Body	Impaired Utilization or Absorption	Strategies to Enhance Availability
Protein	Muscle and bone development, Fracture reduction.	Insulin resistance. Protein anabolic resistance.	Increased aerobic exercise can have positive effect on protein anabolism and reduce insulin resistance byincreasing microvascular supply of amino acid.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

Iron	Oxygen transport, Hormone synthesis, Component of enzymes and cytochrome and plays role in electron transport, Thyroid metabolism.	Increased non-heme iron levels in body organs (brain, heart, liver, kidney). Increased hepcidin levels. Regular usage of aspirin.	Iron chelation therapy in case of excess iron accumulation. Dietary intake of heme and non-heme sources of iron like meat and meatproducts, fish (tuna,sardine), egg, fortified breakfast cereals, dry fruits, dark green vegetables, soya bean,chickpea, tofu, kidney beans, lentil etc.
Calcium	Osteoporotic fracture prevention, Maintenance of bone health, Regulation of neurotransmitters and nerve excitability. .	High sodium diet increases urinary calcium loss. Oxalates in spinach, walnuts and sorrel, tannins in tea and phytate in bran, nuts, seeds and most cereals reduce intestinal calciumabsorption. Inadequate Vitamin D3 levels.	Diet rich in calcium and supplementation of calcium and vitamin D3 in case of severe hypocalcemia.
Zinc	Normal functioning of immune system, Anti-inflammatory properties, Prevention of apoptosis, Taste acuity, Cognitivefunctioning.	Altered zinc transporter expression due to epigenetic dysregulation affects zinc homeostasis. Degenerative alterations in intestine with age.	Intake of zinc supplementation.
Magnesium	Neuromuscular excitability,Co-factor for protein synthesisand nucleic acid synthesis.	Altered vitamin D3metabolism decreasesintestinal absorption. Use of excessive diuretics reduces Mgreabsorption.	Adequate dietary intake of magnesiumrich foods like whole grains, green leafy vegetables, beans, nuts and fruits.
Vitamin D3	Intestinal calcium absorption,Maintenance of muscularstrength, Prevention of osteoporosis andosteomalacia.	Lower cutaneous VitaminD3 synthesis.	Supplementation of vitamin D3.
Vitamin B12	Improve cognitive performance, Breakdown of homocysteine (risk	Malabsorption due to gastrointestinaldisorders. Excess use of drugs that	Consumption of B-complex or multivitamin supplements containing1000 mcg

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

	factor for cardiovascular diseases).	interfere with B12absorption. Food-cobalamin malabsorption syndromeIntestinal malabsorption.	cobalamin daily.
Vitamin B9	Improve cognitive performance, Metabolism of homocysteine(risk factor for cardiovasculardiseases), Formation of nerve tissues and blood cells,Synthesis of nucleic acid.	Intestinal malabsorption due toatrophicgastritis. Long term intake of high doses of gastricacid secretion suppressor drugs.	Vitamin B supplementation
Vitamin B6	Improve cognitive performance,Breakdown of homocysteine (riskfactor for cardiovascular diseases), Co-factor for enzymes involved in synthesis, catabolism, decarboxylation, transformation ofamino acid and metabolism ofnucleic acid and lipids.	Altered proteinmet-abolism and inflame-mation by chronic diseases.	Vitamin B supplementation.

2.2. Calcium and Vitamin D3

For optimum bone health, calcium and vitamin D3 plays a crucial role. The process of aging is characterized by several losses, of which loss of bone mineral density is most common and can lead to severe osteoporotic fractures and can limit the mobility of elderly. The elderly women are at a higher risk of bone loss which is 2-3% per year as compared to men. This greater bone loss among women occurs after menopause, which is due to estrogen deficiency resulting in decreased intestinal calcium absorption. This deficiency also leads to decreased re-absorption of calcium by the kidneys and increased secretion of parathyroid hormone and bone resorption. This increased bone turnover in older adults is also due to vitamin D3 deficiency which in turn affects calcium homeostasis by decreasing intestinal calcium ab sorption. Deficiency of vitamin D3 among elderly is due to decreased ability of skin to synthesize it. Also, the decreased exposure to sun adds to this deficiency. The failure of kidney to convert 25(OH) vitamin D3 to 1,25 (OH) vitamin D and decreased ability of intestine to receive vitamin D3 further increases vitamin D3 deficiency. Reported that serum 25(OH)D levels below 50 nmol/l are associated with increased muscular weakness and decreased physical function among elderly, whereas levels below 25-30 nmol/l increases susceptibility to falls and fractures.

It was reported that in America, very less women (>1%) and about 25% men above 70 years were able to meet their requirement for calcium through diet. Study on free living Australian women aged 70-85 years revealed that calcium intake among them was 900-980 mg/day and about 70% of the population fails to meet estimated average requirement of 1100 mg/day [23]. In Western countries, the mean calcium intake among older subjects is 700-900 mg/day and still lower in people dwelling in Asia and Africa. Thus, on an average, older adults tend to have less calcium intake which is approximately 600mg/day and hence are more prone to osteoporotic fractures and falls. Calcium intake of 1000-1200 mg/day is advised for elderly population for the maintenance of optimum bone health. Dawson-Hughes suggested an

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

average intake of 20-25µg/day, i.e. 800-1000 IU/day of vitamin D3 among elderly is important for maintaining serum 25(OH)D levels of 75nmol/L which will be beneficial in lowering the risk of falls and fractures.
Intake of approximately 800 IU/day will be sufficient for older adults having appropriate exposure to the sun, whereas those having limited sun exposure and are obese need to have a high intake of approximately 2000 IU/day. Intestinal calcium absorption is affected by various components in the diet. The antinutrients present in food like phytates, oxalates and tannins are known to form insoluble complexes with calcium, contributing to reduced intestinal calcium absorption. High sodium diet is related to increased calcium loss in the urine, leading to decreased calcium retention. Hence, to reduce the prevalence of osteoporotic fractures, both calcium and vitamin D3 levels should be maintained which can be achieved either through dietary sources or through supplementation. It was reported by Zhu and Prince that the risk of falls and fractures can be reduced with intake of 1200 mg/day of calcium alone or 1200mg/day calcium and 1000 IU/day vitamin D3.

2.3 Zinc

Zinc is an essential micronutrient involved in enzymatic catabolism, transcription, signal transduction for the functioning of immune cell, DNA synthesis and various micronutrient metabolisms. The elderly has been reported to have low concentrations of serum zinc, which contributes to a weakened immune system and makes them susceptible to infections and thus increases the risk of morbidity among them. With aging T-cell mediated functioning is impaired, particularly due to zinc deficiency. The synthesis of metal lanthionine decreases and this cause zinc imbalance in the gut and other tissues. The main factor responsible for this insufficiency is improper dietary zinc intake coupled with other intrinsic and extrinsic factors. Other factors which lead to poor zinc status in elderly includes poor mastication of food, oral problems limiting food intake, ingestion of several medications which alter the physiology of absorption and some psychosocial factors which limit the food intake.

Hypothesized that decreased levels of zinc with progressing age are due to epigenetic alterations such as DNA methylation, which contribute to zinc transporter impairment, resulting in decreased absorption of zinc and hence low zinc levels in elderly. Zinc absorption in older age is influenced by numerous factors. Altered villus shape, changes in mitochondria, elongation of crypts, alterations in collagen and increased cryptal cell replication time significantly alters the zinc absorption among elderly. Also, alterations in intestinal microvilli and enterocytes in the large in testine decreases zinc absorption. The presence of anti-nutritional factors in the diet like phytates and some minerals like iron and calcium imposes inhibitory effect on zinc ab sorption. However.It showed that phytate may not be a major determinant of decreased zinc absorption.The recommended dietary allowances of zinc for older men is 11 mg/day and for older women is 8 mg/day with an upper tolerable limit of 25-40 mg/day which includes both the dietary zinc and supplemental zinc. It has been shown that people above 60 years are having zinc intake below 50% than what is recommended for proper functioning of body systems. Third Health and Nutrition Survey data showed that in the United States, only 42.5% of the older population (> 71 years) were having an adequate zinc intake and a majority was suffering from zinc deficiency.
Zinc deficiency also affects the functioning of other nutrients through its interaction. Synthesis of Retinol-Binding Protein (RBP) is dependent upon zinc, which is required to transport vitamin A to plasma and for mobilization of retinol from the liver. With less serum zinc concentration, this transportation of retinol is impaired. Low zinc status in creases vitamin E requirement due to decreased intestinal absorption. Whereas this low or marginal zinc status also decreases folate absorption from food. The decreased gustatory sense which strongly affects the food intake among the elderly is also due to zinc deficiencies. To meet the upper tolerable limit of 40mg of zinc per day, from both dietary sources and supplementation must be taken into account and this will help in normalizing serum zinc concentration, in the case of zinc deficient elderly subjects. Various dietary sources of zinc like seafood, poultry, red meat, beans, fortified breakfast cereals, whole grains, nuts and dairy products can help in maintaining adequate zinc status. However, zinc absorption is more from animal protein sources as compared to plant protein sources.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

2.4. Iron

Iron deficiency is very common among elderly population and contributes to anemia amongst them. The inability of the body with advancing age to maintain a balance between iron store and iron supply amplify the condition of anemia. This iron deficiency is multifactorial, which means that there are numerous factors responsible for this condition. With advancing age, the decreased food intake, frequent medications, gastrointestinal malabsorption and occult bleeding are the common causes that results in this deficiency. Iron malabsorption is also one of the factors contributing to iron deficiency and this result in excessive iron accumulation in elderly. This age-related anemia can also be due to increased hepcidin levels, a regulatory hormone, which decrease iron absorption in the intestine and results in low iron levels.

The recommended daily allowance of iron for both the sexes is 8 mg/day with the upper tolerable limit of 45 mg/day. According to World Health Organization (WHO), the women having hemoglobin levels <12g/dl and men having hemoglobin levels <13mg/dl are categorized as anemic. The third US National Health and Nutrition Examination Survey (NHANES III) data reported the prevalence of anemia among people aged above 65 to be 10.2% in women and 11% in men. With increasing age, the prevalence rate of anemia was also known to increase. Studies have reported that in people aged 75 years and above, the prevalence rates were 14.9-15% in men and 7.1-12.7% in women. People 85 years and above showed more prevalence rates of 29.6-30.7% in men 16.5-17.7% in women. Studies conducted in the United States and Europe on older adults indicated that the prevalence of anemia among these populations ranges from 8-25%. The low levels of iron not only affect the quality of life, but are also known to be associated with other factors like depression, fatigue, impairment of cognitive functioning and loss of muscle strength.

The various constituents present in diet play a pivotal role by affecting the bioavailability of iron. The tannins and polyphenols present in tea and coffee exhibit an inhibitory role in iron absorption, whereas vitamin C rich food components are known to enhance iron absorption. However, iron and vitamin C interaction is known to generate free radicals. The conversion of ferrous ions to ferric ions generates *OH free radicals. These ferric ions are converted back to ferrous ions by vitamin C and this results in another cycle of free radicals from newly formed ferrous ions. However, this generation of free radicals occurs only in case of iron overload in the body. In case of iron deficiency, vitamin C helps in enhancing iron absorption. The intake of aspirin in elderly to treat CVDs is associated with low concentrations of serum ferritin. Iron deficiency can be corrected by consumption of diet adequate in iron. Besides this, iron supplementation can be an alternate for treatment of severe iron deficiency anemia. Oral iron therapy with 300mg of ferrous sulfate tablets having 60 mg elemental iron can also be a measure of recovery from severe iron deficiency. The people who fail to respond to oral treatment, an intravenous iron replacement can be an option. Also, iron chelation therapy can be adopted in case of age-related iron overload among elderly.

2.5. B-Vitamin Complex

B-vitamin complex consist a group of eight water soluble vitamins, which have interrelated functions in maintaining the cellular function and brain atrophy. Among elderly, deficiency of vitamin B12, B6 and folate are known to affect cognitive functioning and is accompanied with depressive symptoms prevalent among older adults. The Recommended Dietary Allowance (RDA) for this vitamin is 0.9-2.4 µg/day, but the estimated average requirement in the United States and Canada is 0.7-2µg/day throughout the life span. Elderly with plasma vitamin B12 levels below 148pmol/L are considered to be severely deficient in this vitamin, whereas those with levels in the range of 148-221pmol/L are marginally deficient. The deficiency of B-complex vitamins, particularly B6, B12 and folate is associated with increased serum homocysteine levels. This elevated level increases the risk of diseases like Alzheimer's disease and dementia, which is very common among this age group. Increasing the intake of these vitamins can lower the risk of developing these disorders by reducing the levels of plasma homocysteine. The frequent use of laxatives to treat constipation in elderly disturbs the gut metabolism and affects the absorption of vitamin B complex in the digestive tract.

National Health and Nutrition Examination Survey (1999-2002) have shown that among US population, about 6% of elderly (age > 70 years) are severely deficient in vitamin B12 and more than 20% elderly (age > 60 years) are mildly deficient. According to recent studies, more than 20% of the elderly population are at risk of vitamin B12 deficiency. The prevalence of this deficiency is due to insufficient food intake and malabsorption of vitamin B12 due to

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

degenerative digestive conditions. Data from Framingham Offspring Study on elderly people revealed the elevated plasma gastrin levels in 24% of those aged 60-69 years and 37% in those aged above 80 years. The altered digestive function elevates the gastrin levels, which in turn causes malabsorption of vitamin. The prevalence of vitamin B6 deficiency among European institutionalized elderly population is below 1-75%.

These vitamins are found mainly in animal food sources. Therefore, its deficiency is more prevalent due to low consumption of animal food sources owing to cultural or religious limitations and also due to the high cost of these foods. Adoption of dietary fiber therapy to treat constipation, reduces the use of laxatives and enhances vitamin B12 absorption. As vitamin B12 is found in animal food sources, thus fortified foods can be an alternative for vegetarians to normalize their serum vitamin B12 levels.

III. CONCLUSION

In conclusion, people these days are more aware of their health, they are always searching for ways to help them be healthier. The use of expert systems can improve people awareness and help them get a proper advice.
The developed expert system provides expertise in nutrition consulting. It offers a wide range of advises about nutrients quantity that meet the basic needs of the body; such nutrients as proteins, vitamins, fiber, and some kind of minerals. Also, the system helps the users to make a decision to increase or decrease their weight by knowing their body type. Moreover, nutrition system will provide you with meal plans and the foods you need to eat for your particular body type.
Much background work has pointed to the important role of diet and nutrition in the health status of the elderly. Patients who have obvious nutritional problems, both undernutrition and overnutrition, are likely to suffer more disability and are at greater risk of premature death than elderly patients without nutritional problems. Physicians must suspect nutritional disorders in the elderly. A detailed clinical history, which may be preceded by a self-administered questionnaire, will indicate whether the person is at moderate or high risk of nutritional deficiencies. A thorough physical examination including measurement of weight and height will confirm the presence of clinically significant protein-calorie malnutrition. For common nutrient deficiencies a few screening tests may be required, such as measurements of serum albumin and hemoglobin levels. In selected instances, it may be necessary to order additional laboratory tests and to refer the patient to a nutritionist for more detailed assessment.

REFERENCES

[1]. Grassi M, Petraccia L, Mennuni G, Stephen DW, Prashanthi V, Val JL, et al. Changes, functional disorders, and diseases in the gastrointestinal tract of elderly. Nutr Hosp 2011; 26: 559-67.
[2]. Amarya S, Singh K, Sabharwal M. Changes during aging and their association with malnutrition. J Nutr Gerontol Geriatr 2015; 6: 78- 84.
[3]. World Population Ageing 2015; United Nation, New York.
[4]. World Population Prospects: The 2017 Revision. Key Findings and Advanced Tables, United Nation, New York, 2017.
[5]. Jin K. Modern biological theories of aging. Aging Dis 2010; 1: 72.
[6]. Wyka J, Biernat J, Mikołajczak J, Piotrowska E. Assessment of dietary intake and nutritional status (MNA) in Polish free-living elderly people from rural environments. Arch Gerontol Geriatr 2012; 54: 44-9.
[7]. Sanford AM. Anorexia of aging and its role for frailty. Curr Opin Clin Nutr Metab Care 2017; 20: 54-60.
[8]. Theou O, Cann L, Blodgett J, Wallace LM, Brothers TD, Rockwood K. Modifications to the frailty phenotype criteria: Systematic review of the current literature and investigation of 262 frailty phenotypes in the Survey of Health, Ageing, and Retirement in Europe. Ageing Res Rev 2015; 21: 78-94.
[9]. Campitelli MA, Bronskill SE, Hogan DB, Christina D, Joseph EA, Sudeep G, et al. The prevalence and health consequences of frailty in a population-based older home care cohort: a comparison of different measures. BMC Geriatrics 2016; 16: 1-10.
[10]. Visvanathan R. Anorexia of aging. Clin Geriatr Med 2015; 31: 417-27.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, May 2023

[11]. Doets EL, Kremer S. The silver sensory experience- A review of senior consumers' food perception, liking and intake. Food Qual Prefer 2016; 48: 316-32.

[12]. de Boer A, Ter Horst GJ, Lorist MM. Physiological and psychosocial age-related changes associated with reduced food intake in older persons. Ageing Res Rev 2013; 12: 316-28.

[13]. Landi F, Calvani R, Tosato M, Anna MM, Elena O, Giulia S, et al. Anorexia of aging: Risk factors, consequences, and potential treatments. Nutrients 2016; 8: 1-10.

[14]. Martone AM, Onder G, Vetrano DL, Elena O, Matteo T, Emanuele M, et al. Anorexia of aging: A modifiable risk factor for frailty. Nutrients 2013; 5: 4126-33.

[15]. Turner MD, Ship JA. Dry mouth and its effects on the oral health of elderly people. J Am Dent Assoc 2007; 138: S15-S20.

[16]. Mocchegiani E, Romeo J, Malavolta M, Laura C, Robertina G, Ligia-Esperanza D, et al. Zinc: Dietary intake and impact of supplementation on immune function in elderly. Age 2013; 35: 839- 60.

[17]. Bauer J, Biolo G, Cederholm T, Matteo C, Alfonso JC, John EM, et al. Evidence-based recommendations for optimal dietary protein intake in older people: A position paper from the PROT-AGE Study Group. J Am Med DirAssoc 2013; 14: 542-59.

[18]. Breen L, Stokes KA, Churchward-Venne TA, et al. Two weeks of reduced activity decreases leg lean mass and induces "anabolic resistance" of myofibrillar protein synthesis in healthy elderly. J Clin Endocrinol Metab 2013; 98: 2604-12.

[19]. Shock NW, Greulich RC, Andres R: Normal Human Aging: the Baltimore Longitudinal Study of Aging (NIH publ no 84-2450), US Dept of Health and Human Services, Washington, 1984.

[20]. Chandra RK: Nutritional regulation of immunity arld risk of infection in old age. Immunology 1989; 67: 141-147.

[21]. Chernoff R, Lipschitz DA: Nutrition and aging. In Shils ME, Young VR (eds): Modern Nutrition in Health and Disease, Lea & Febiger, Philadelphia, 1988: 983-999.