Mini Review

Nutrition for Elderly Patients with Cardiovascular Diseases

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Abstract

In nutritional guidance to prevent the development of arteriosclerosis, keep the calorie intake appropriate, suppress the intake of unsaturated fatty acids, refrain from sugar and salt, and limited alcoholic beverages consumption are advised. In recent years, in addition to these diets for preventing arteriosclerosis, as the number of undernourished elderly cardiovascular disease patients increases, more complicated nutritional guidance considering malnutrition is required.

Many elderly patients with heart failure are undernourished, which is a cause of further deterioration of mental and physical function. It is useful to accurately evaluate this malnutrition and to perform appropriate interventions such as diet and exercise therapy. In the mini-review, we will summarize the nutritional assessment of elderly patients with cardiovascular disease as the end stage of atherosclerotic diseases and the nutritional assessment tools, which are useful for the evaluation.

The nutritional status can be evaluated more accurately by combining several evaluation items. In the mini-review, we introduce MNA® (Mini Nutritional Assessment), GNRI (Geriatric Nutritional Risk Index), CONUT (Controlling Nutritional Status), and the GLIM criteria. These nutritional assessment tools are useful for elderly patients with atherosclerosis and cardiovascular diseases to evaluate their nutritional conditions.

Keywords: Atherosclerosis; Nutrition; Frailty; Sarcopenia; Physical activity; Cardiovascular disease prevention; Elderly; Heart failure

Malnutrition in Elderly Patients with Cardiovascular Disease

With the increase in the elderly, the number of patients with heart failure is increasing in recent years. Malnutrition or malnutrition is one of the important prognostic factors in patients with heart failure, especially in elderly patients with heart failure. In particular, it has been reported that 75-90% of patients with acute decompensated heart failure are undernourished. The proportion of 65-year-old or older of malnutrition trends in Japan is 10.3% in men and 20.3% for women. The proportion of malnutrition in patients with heart failure is unusually high.

Malnutrition in Heart Failure

In the state of cachexia, a systemic metabolic disorder syndrome with a decrease in skeletal muscle mass observed in chronic wasting diseases, gradual weight loss is observed in patients with chronic heart failure, chronic kidney disease, chronic obstructive pulmonary disease, and various cancers. Bodyweight and Body Mass Index (BMI) has been shown to be useful indicators of nutritional status in patients with heart failure, and patients with low BMI have a poor prognosis. In patients with heart failure, unintentional weight loss is an important indicator of poor prognosis, and weight loss of 7.5% or more over 6 months is considered an independent poor prognostic factor.

On the other hand, obese people are more likely to have hypertension, diabetes, and arteriosclerotic diseases. Therefore, assessing nutritional status based on BMI alone causes a misunderstanding due to the "obesity paradox" in elderly patients with atherosclerosis [1,2].

Frailty

Frailty is defined as a state that is located between a healthy state and a state requiring long-term care, and indicates a state in which deterioration of physical function and cognitive function is observed [3]. With proper treatment and prevention, the frail condition may not go into need of care. Frail is diagnosed if 3 or more of the 5 items of weight loss, decreased walking speed, muscle weakness, tiredness, and decreased physical activity level are applicable, and pre-frail is determined if 1 to 2 items are applicable.

Frailty causes malnutrition and increases the risk of hospitalization, admission, falls and death, but proper exercise interventions, nutritional interventions, and social participation can improve health. Frailty is highly prevalent in specific cardiovascular disease and females [4]. Since interventions such as adequate dietary intake, well-balanced diet, and proper exercise guidance are required, it is important to evaluate frailty in elderly patients with cardiovascular diseases [5].

Sarcopenia

Sarcopenia refers to muscle weakness and weakness/physical

function. Sarcopenia is characterized by progressive and systemic skeletal muscle mass and skeletal muscle strength decline with age, and is accompanied by decreased physical function and the Quality of Life (QOL), so early detection and appropriate intervention are desired. It is classified into primary caused by aging and secondary caused by "decreased physical activity", "disease" and "malnutrition". These parameters reflecting muscle function of the lower limbs are associated with atherosclerosis in patients with ischemic heart disease [6].

Frailty Cycle in Elderly Patients with Cardiovascular Diseases

Symptoms of heart failure, such as dyspnea, tiredness, loss of appetite, and abdominal bloating, can cause malnutrition and decreased activity. In addition, malnutrition and aging cause sarcopenia, and it is thought that frailty progresses while repeating a vicious cycle of muscle weakness and physical function deterioration [7]. In heart failure, securing sufficient energy and protein and proper exercise are expected to improve QOL of patients [8]. Especially for malnutrition, the intervention of a registered dietitian is effective because it is necessary to respond to each individual patient. However, it is also necessary to pay close attention to patients who are gradually losing weight and weakening their physical strength and immunity. An important thing is that not only medical professionals but also patients properly recognize that heart failure causes malnutrition and sarcopenia, which causes gradual frailty syndrome [9].

Risk Factors of Malnutrition

Malnutrition is a condition having insufficient nutrients to live healthy. The decrease in muscle strength and muscle mass with aging is a natural senility phenomenon, but when "malnutrition" is added to it, the state progresses to "frail", and causes sarcopenia and locomotive syndrome. Therefore, malnutrition has been emphasized as one of the causes of the late elderly becoming in need of nursing care state and bedridden.

Social factors that cause the elderly to become undernourished include living alone, lack of long-term care, neglect, loneliness, and poverty. Psychological and psychological factors include cognitive dysfunction, depression, and fear of aspiration and choking. In the disease factors, various organ failure, inflammation, malignant tumor, pain. Moreover, other problems like oral trouble, drug side effects, chewing/swallowing disorders, physical inactivity, or constipation, are also considered as important factors for malnutrition of elderly patients. In addition, aging involvement includes olfactory/taste disorders and loss of appetite, problems with inappropriate eating habits, misunderstandings about nutrition, and misleading by medical staff sometimes may induce the malnutritional condition.

Evaluation of Nutritional Status

The nutritional status can be evaluated more accurately by combining several evaluation items. Therefore, it is recommended to combine multiple nutritional assessment items such as MNA® (Mini Nutritional Assessment), GNRI (Geriatric Nutritional Risk Index), CONUT (Controlling Nutritional Status), and the GLIM criteria. These nutritional assessment tools are used for not only heart failure patients but also nutritional evaluation of elderly patients with general cardiovascular diseases in cardiac rehabilitation.

MNA® (Mini Nutritional Assessment)

This nutritional evaluation tool was developed mainly for the early detection and treatment of malnutrition syndrome in the elderly [10]. MNA® is a simple screening method based on interviews, consists of six prognostic items and 12 of the interview items, it will be evaluated in a total of 30 points. If it is difficult to measure your body and BMI cannot be measured, replace it with the maximum calf circumference, that is, the lower leg circumference. The cutoff value is 31cm, but it is desirable for Asians to use 28cm as the cutoff value.

At present, the MNA®-short form (MNA®-SF, simple nutritional status evaluation table) has been widely used. In studies using MNA®-SF and MNA® targeting heart failure patients, similar results were obtained. In patients classified into low nutrition, MNA®-SF is has been reported that higher mortality and readmission rates [11].

GNRI (Geriatric Nutritional Risk Index)

GNRI is a nutritional evaluation method published in 2005 and is reported to be an accurate predictor of mortality in the elderly [12]. The nutritional status is predicted by the numerical value calculated by the formula using only the serum albumin level and the body weight as an index of the nutritional status [13,14]. As an ideal body weight, use a body weight with a BMI of $22kg/m^2$. A study of 152 patients with heart failure with an average age of 77 years showed significantly higher mortality in patients with GNRI <92. Patients with a score of less than 82 were reported to have severe malnutrition, and patients with a score of 98 or higher were reported to have no malnutrition.

CONUT (Controlling Nutritional Status)

Serum albumin has a long half-life of about 20 days and is easily affected by various pathological conditions, so it has been considered that serum albumin alone is not suitable for evaluating nutritional status. Therefore, the CONUT was developed as a tool for evaluating nutritional status from three biometric indicators: protein metabolism, immunocompetence, and lipid metabolism [15].

Serum albumin level is scored as protein metabolism, total lymphocyte count is scored as immunity indicators, total cholesterol level is scored as lipid metabolism, and nutritional status is comprehensively and multifacetedly evaluated from three types of biomarkers. This CONUT has been reported to be a useful index for early screening of malnutrition in patients with heart failure [16], but if you are taking a therapeutic drug for dyslipidemia such as statin due to coronary artery disease, be careful about its interpretation.

GLIM criteria

The Global Leadership Initiative on Malnutrition (GLIM) criteria is the world's first international standard for malnutrition diagnosis published in 2018, and four academic societies in Europe, the United States, Asia, and South America participated in the formulation [17]. The top five ranked criteria included three phenotypic criteria (weight loss, low body mass index, and reduced muscle mass) and two etiologic criteria (reduced food intake or assimilation, and inflammation or disease burden).

To diagnose malnutrition at least one phenotypic criterion and one etiologic criterion should be present. Malnutrition defined according to the GLIM criteria was a predictor of both low physical

function and mortality in patients with CVD [18].

Evaluation of Nutritional Function

In the disease management for elderly patients with cardiovascular diseases, the evaluation of nutritional intake function and its status is also important as well as the evaluation of the nutritional status.

Swallowing function evaluation

To assess swallowing function, count the number of times a participant can swallow saliva in 30 seconds [19]. The repeated saliva-swallowing test is carried out as a screening test of swallowing evaluation, and three or more times are considered normal. If it is less than 3 times, it is evaluated that swallowing function may be impaired, so a more detailed test is required.

Nutrition assessment items

In the Nutritional Support Team (NST) of the ward, medical history, physical examination, anthropometric, blood tests, and physical function evaluation, are evaluated as the nutrition assessment items. Sometimes it is necessary to evaluate data from additional blood tests and measure body composition and muscle mass for the physical function measurement of cardiac rehabilitation.

Anthropometry method

Triceps Skin Fold thickness (TSF) and the upper arm circumferential length is measured as a nutritional evaluation index [20]. As a specific measurement method, the circumference of the upper arm is measured by measuring the circumference of the bone at the shoulder and the midpoint of the elbow. Subcutaneous fat thickness of the triceps brachii is measured by pinching the skin behind the arm 2cm above the midpoint.

Estimating the amount of energy required using the Harris-Benedict

The amount of energy required for hospitalized patients is estimated using the Harris-Benedict equation [21]. The amount of energy required is calculated by multiplying the basal metabolic rate by the activity coefficient and stress coefficient.

Nutrition Therapy for Heart Failure

Nutrition therapy for patients with acute and chronic heart failure is good and adequate nutrition in addition to salt reduction and water management [22]. Even in patients with severe elderly heart failure, enteral nutrition should be started earlier and the diet should be changed to a soft diet with less burden on the digestive tract.

Moderate to severe acute heart failure

In patients with acute heart failure of heart failure stages C and D, appropriate enteral nutrition should be started as early as possible based on the target energy and nutritional composition calculated from various indicators.

Mild chronic heart failure

For outpatients with heart failure stages A and B who are no malnutrition, in addition to adequate energy intake, eat a lot of fresh vegetables and fruits, fish and fiber-rich foods are recommended. On the other hands, too much salt intake and sweets, saturated fatty acids, trans fatty acids are not recommended. These dietary recommendations are almost the same to patients with conventional arteriosclerotic diseases.

Generally Recommended Diet for Patients with Cardiovascular Disease and Its Prone

Dietary patterns useful for preventing cardiovascular events include the Mediterranean diet, the Dietary Approaches to Stop Hypertension (DASH), and Washoku (Japanese traditional cuisine).

Mediterranean diet

The Mediterranean diet is based on the traditional cuisine of countries bordering the Mediterranean Sea like Italy, Spain, and Greece in 1960s. The diet emphasizes fruits, vegetables, fish, wine, olive oil, nuts, and whole grains, and less dairy and meat than a typical Western diet. Its benefits are reported a lot including weight loss, preventing heart and brain diseases, cancers, and diabetes [23,24].

DASH diet

The DASH diet is a flexible and balanced eating plan and a lifelong approach to healthy eating that is originally designed to help treat and prevent hypertension. The DASH diet recommends eating vegetables, fruits, and whole grains; including fat-free or low-fat dairy products, fish, poultry, beans, nuts, and vegetable oils; limiting foods with high in saturated fat and sugar-sweetened beverages and sweets. The DASH-like diets have been proved to significantly, protect against cardiovascular diseases, stroke, and heart failure [25].

Washoku

Washoku, Japanese food, is registered as a UNESCO intangible cultural property and is attracting worldwide attention as a healthy food. It consumes less meat and fat, and consumes more soybeans, fish, vegetables, seaweed, mushrooms, and fruits. It is characterized and has been reported to be associated with a reduced risk of cardiovascular death26. However, it has been pointed out that there are many foods such as soy sauce, miso soup, and pickles that increase salt intake, especially in East-Northern part of Japan. For this reason, a Japanese food pattern with reduced salt is recommended [27].

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