

# Progress in the Study of Debility in Elderly Patients with Coronary Heart Disease

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## Abstract

Frailty is common in elderly patients with coronary heart disease, which has high mortality and disability rates. If effective intervention is not carried out in time, it will bring many effects to the patients, their families, and society. Therefore, attention should be paid to the early identification of frailty in elderly patients with coronary heart disease, so as to formulate personalized diagnosis and treatment interventions for patients and try to improve the quality of life and self-management ability of patients. In recent years, there have been many studies on coronary heart disease in China, but there are few studies on frailty in elderly patients with coronary heart disease. With the increasing attention to frailty, coronary heart disease is closely related to frailty. People have paid more and more attention to frailty. Therefore, this article reviews the research status, tools for assessment, risk factors, and intervention programs for frailty in elderly patients with coronary heart disease. The aim is to provide a reference for clinical research in this area.

## Keywords

The elderly; Coronary heart disease (CHD); Frailty; Assessment tools

Coronary heart disease (CHD) is one of the common diseases in the elderly, and its incidence increases with age, so the number of elderly patients with CHD is also growing. "Practice Guidelines for the Comprehensive Management of Cardiovascular Disease in Primary Care 2020" points out that at present, there are about 11 million elderly patients with CHD in China, and it is expected that by 2030, the number of elderly patients with CHD will increase to 22.63 million [1]. CHD and frailty interact and promote each other. According to surveys, elderly patients with CHD are very susceptible to frailty, and the incidence of frailty is as high as 48.5%-79.0%. The mortality rate of elderly patients with CHD with frailty is also twice that of elderly patients with CHD without frailty [2]. It also increases long-term care and economic burden for family members [3]. At present, there are many studies on CHD in China, but there are few studies on frailty in elderly patients with CHD. With the increasing attention to frailty, CHD is closely related to frailty. Therefore, this article reviews the research progress of frailty in elderly patients with CHD, such as the overview, assessment tools, risk factors, and intervention measures.

## 1. Overview of CHD in the elderly

CHD refers to coronary artery atherosclerosis or functional changes, narrowing the blood vessels, leading to myocardial ischemia, hypoxia, necrosis, and heart disease. It has the characteristics of high mortality, high disability rate, and high recurrence rate, and the prevalence increases with age, the main causes of acute onset are emotional excitement and overwork; The causes of chronic disease are mainly smoking, drinking, high-salt diet, hyperlipidemia, hypertension, hyperglycemia, obesity, lack of exercise and genetic factors [4]. The onset of CHD is characterized by

angina pectoris and myocardial infarction. The onset of angina pectoris lasts only a few minutes and can be relieved by rest or sublingual nitroglycerin. However, during the onset of myocardial infarction, chest pain lasts for a long time and can not be relieved by rest or sublingual nitroglycerin, and dangerous symptoms such as shock, acute heart failure, and sudden death are prone to occur [5]. Studies have found that the number of elderly patients with CHD in our country is growing, and patients are often accompanied by a variety of chronic diseases and different degrees of dysfunction, which easily leads to the reduction of the quality of life of patients, insufficient activity tolerance and shortened life expectancy. At the same time, high treatment costs and long-term care also bring a huge burden to family members [6].

## 2. Overview of debility

At present, there is no uniform definition of frailty, and there are two accepted definitions of frailty in the academic community: one is Fried et al. [7] pointed out that frailty is a clinical syndrome, which is characterised by a weakening of the body's physiological reserve function and an increased susceptibility to stressful events, which leads to a decrease in the body's adaptive ability to the internal and external environments and is often accompanied by symptoms such as a decrease in body mass index, slowing of gait, decreased muscle strength, cognitive dysfunction and decreased tolerance of conscious activity; the other is Rookwood et al [8] defined frailty as a cumulative state of health deficits involving multiple domains, and the risk of the patient suffering from frailty is reduced. symptoms such as decreased self-conscious activity tolerance; the other is Rookwood et al [8] defined debilitation as a cumulative state of health deficits involving multiple domains, and the higher the risk of patients suffering from debilitation. The gradual increase in the degree of debility leads to a variety of adverse events in elderly patients with CHD, such as higher rates of re-hospitalisation, increased complications, and increased risk of death [9].

## 3. Tools for assessing frailty in elderly patients with CHD

### 3.1 Fried Frailty Scale

Fried Frailty Scale [7] is the earliest and most widely used frailty assessment tool in clinical practice, which uses a combination of subjective and objective measurements, focusing on the assessment of physical strength, muscle strength, nutrition, and other aspects of elderly patients with coronary heart disease. The findings of Li et al. [10] suggest that the Fried frailty scale can better assist in the diagnosis of frailty in elderly patients with CHD, thereby reducing the incidence of adverse events, but because the scale has not yet been sinicised, it is not applicable to the Chinese population.

### 3.2 FRAIL Frailty Screening Scale

The FRAIL Frailty Screening Scale [11] is based on the Fried Frailty Phenotype, which uses a questionnaire and is a relatively simple test. The results of the study by Hou [12] and others showed that the FRAIL scale has the characteristics of high sensitivity, simplicity, and time-saving in screening elderly patients with CHD debility. However, the scale was not sinicised.

### 3.3 Frailty Index

Frailty Index (FI) [13] focuses on the comprehensive assessment of elderly patients with COPD. The findings of Walker [14] showed that FI is more detailed in grading frailty. Its advantage is that it can better understand the subtle differences in the degree of debilitation in different elderly patients with coronary artery disease, and its disadvantage is that the assessment is numerous and time-consuming, so it is not applicable to clinical studies.

### 3.4 Edmonton Frailty Assessment Scale (EFAS)

Edmonton Frailty Assessment Scale (EFS) [15] was developed by Rolfson. in 2006. Our scholars Yang Liu et al. Chineseised the scale in 2016 [16], and the Cronbach's  $\alpha$  coefficient of the scale was 0.780, with good reliability and validity. However, the sinicised scale was only cited 11 times, which shows that it has not been widely used in China.

## 4. Risk factors for frailty in elderly patients with CHD

### 4.1 Socio-demographic information

Age is a common independent influencing factor for frailty and pre-frailty in elderly patients with CHD [17], i.e., the

older the age, the greater the likelihood of CAH frailty; Chen Ying *et al.* [18] found that compared with patients aged greater than 70 years, age 60-69 years (OR=0.348,95% CI:0.159-0.764) was a protective factor against frailty in elderly patients with CHD in the community, Crow [19] found in a 5-year longitudinal study of > 60-year-olds that the incidence of cardiovascular disease mortality and debilitation increased with age. Therefore, it is important to pay more attention to the debilitating condition of elderly coronary patients. Gordon [20] pointed out that the priority population for preventing the occurrence of debilitation is elderly women with CHD. The findings of Li [21] also verified the idea that the prevalence of frailty in elderly female CHD patients is higher than that in elderly male CHD.

## 4.2 Psychosocial factors

A large amount of inflammatory factors in elderly patients with CHD increases the risk of developing depression, while depression leads to a reduction in patients' social activities and interpersonal skills, thus increasing the risk of debility. Veronese [22] followed up with more than 4,000 elderly coronary artery disease debilitated patients who did not suffer from depression for two years and found that 360 of them suffered from depression, and thus proposed that debility is a significant risk factor for predicting depression in elderly patients with CHD.

## 4.3 Multi-disease coexistence and multiple medications

Elderly patients with coronary artery disease with more coexisting diseases are more likely to be exposed to high-risk factors for frailty. A study by Zeng [23] showed that elderly patients with CHD who were elderly and had coexisting tumours and chronic obstructive pulmonary disease had a higher incidence of frailty. A study by Li Xin [24] found that multiple medication use in patients with coronary artery disease was a risk factor for debility. Zhang Ning *et al.* [25] found that the coexistence of multiple diseases and multiple medication use in elderly patients with debilitating coronary artery disease is very common, and at the same time, the re-hospitalisation rate and mortality rate of debilitated patients are also higher than that of non-debilitated patients, which suggests that clinical health care personnel should pay attention to other coexisting diseases and medication use of the elderly at the same time as they are diagnosing and treating elderly patients with CHD, so as to preventively reduce the incidence of debilitation in elderly patients with CHD.

## 4.4 Hypokinesia

Elderly patients with debilitated CHD are generally inactive and have significantly reduced muscle strength, which tends to lead to a decline in the overall physiological function of the patient, thus aggravating the debilitation and increasing the re-hospitalisation and mortality rates of the patients, from which the researchers deduced that the debilitation is related to the reduction of muscle strength. The findings of Zhang [26] showed that walking speed, hand-grip strength, and other indicators that respond to muscle strength were significantly lower in elderly patients with debilitated CHD, suggesting that they are more likely to suffer from sarcopenia.

## 4.5 Nutritional factors

Nanri [27] investigated the relationship between the degree of frailty and protein intake in elderly patients with CHD, and the results of the study were that the higher the degree of frailty of elderly patients with CHD, the lower the protein intake, i.e., the degree of frailty of elderly patients with CHD is inversely proportional to the intake of protein. Protein intake, such as too little, can easily lead to malnutrition, which further damages the immune function of elderly patients with CHD debilitation, leading to reduced resistance, and easy to induce infection, thus aggravating the debilitation. It is suggested that elderly patients with debilitated CHD should pay attention to protein supplementation and strengthen the nutritional treatment of patients.

# 5. Interventions for frailty in older patients with CHD

## 5.1 Exercise training

Weakness and sarcopenia are common in elderly patients with CHD who have little activity and a penchant for sedentary behaviour, so physical training should be focused on these patients. Pang Le [28] showed that if elderly patients with debilitating CHD adhere to exercise every week, it can not only improve muscle strength, but also promote the recovery of cardiac function, thus effectively reducing the mortality rate of patients. Liu [29] results show that exercise can effectively improve the exercise endurance of elderly patients with CHD, as well as enhance muscle strength

and joint flexibility. Overall, exercise is effective in intervening in the patients, but there is still no uniform standard for the specific type of exercise and exercise time.

## 5.2 Nutrition combined with exercise intervention

Malnutrition is an important risk factor for debilitation in elderly patients with CHD, and it is crucial to develop a reasonable dietary plan for the patients. Referring to the dietary plan developed by Rao [30] for elderly osteoporosis patients, the researchers combined the Dietary Guidelines for Chinese Residents, the Mediterranean dietary structure, and the patients' personal constitution to develop a personalised dietary plan for them, and the results of the study showed that the patient's physical functions tended to improve significantly. Yan Hong [31] showed that nutrition combined with exercise intervention can effectively alleviate debilitating symptoms and improve patient's quality of life.

## 5.3 Drug intervention

Risk factors for debility in elderly patients with CHD include multimorbidity and multiple medications, and attention should be paid to the contraindications and adverse effects of these drugs. Su [32] pointed out the feasibility of androgen, insulin, vitamin D, and other factors to intervene in debility, and suggested the application of biomolecular technology to develop targeted therapy to improve the effectiveness of intervention.

## 5.4 Psychological intervention

Yu [33] conducted psychological counselling for 6-12 months for elderly patients with CHD and found that the patients' self-management ability, cognitive function, and mental state were significantly improved, while the researchers suggested that relatives should chat with the patients more often to alleviate the patients' loneliness, depression, and other adverse emotions in a timely manner. Xu [34] assessed four aspects of the patient's ability to perform activities of daily living, cognitive function, balance, and mental status, and then provided them with fine-tuned nursing interventions, which resulted in a significant improvement in the patient's ability to perform activities of daily living and mental status, as well as a reduction in the rate of rehospitalisation.

## 6. Conclusion

In the social context of accelerated aging, the number of elderly patients with CHD infirmity is also increasing. Infirmity not only prolongs the hospital stay of elderly patients with CHD but also independently predicts the poor prognosis of the patients, so early identification of infirmity is very important for elderly patients with CHD. Most of the assessment tools for frailty in elderly patients with CHD were developed by foreign scholars, which do not meet the characteristics of Chinese patients, and the assessment tools for combined CHD and frailty used in China are not yet uniform, so research and development of assessment tools for frailty applicable to the Chinese population are also urgent, and the availability of specific diagnostic and assessment criteria will help to identify risk factors for the occurrence of frailty at an early stage. The summary of risk factors can provide a direction for future interventions.

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