

## Hypertension and frailty

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### Abstract

Hypertension is the most common chronic non-communicable disease and the most burdened disease in the world[1].Hypertension remains the leading cause of death globally, accounting for 10.4 million deaths per year. When reviewing global figures, an estimated 1.39 billion people had high blood pressure in 2010[2].In China, according to the definition of relevant guidelines[3], the blood pressure cut-off point of the diagnostic criteria for hypertension is  $\geq 140/90$  mmHg. According to the diagnostic criteria, the results from the China Hypertension

Survey (CHS) published in 2018 show, The crude prevalence rate of hypertension in the population of 18 years and over in China is 27.9%, and the weighted prevalence rate is 23.2%. Based on this calculation, about one in four adults has high blood pressure, and the total number of hypertensive patients is 244 million[4].In the future, if blood pressure variability is included in the definition, diagnostic criteria, and risk stratification of hypertension, the prevalence of hypertension will increase significantly[5].As we all know, the onset of hypertension is closely related to aging, and age is the primary risk factor for hypertension. Diseases related to aging have been included in the study of comorbidity of hypertension by more

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and more scholars, such as frailty. Some studies [6-7] have found that there are many common pathogenesis mechanisms between hypertension and frailty. Therefore, it is of great significance to study the biological mechanisms of hypertension comorbidity and frailty.

### **Keyword**

hypertension; risk; high blood pressure; frailty

### **Introduction:**

#### **1. Hypertension is an age-related cardiovascular degenerative disease**

The prevalence of hypertension is rising globally owing to aging of the population and increase in exposure to lifestyle risk factors including unhealthy diets (i.e. low potassium intake and high sodium) and of physical activity [8]. The results from CHS show [4] that the prevalence of hypertension increases with age. The prevalence of hypertension among residents is 44.3% in the 55-64 age group, 56.0% in the 65-74 age group, and 59.8% in the  $\geq 75$  years old. In addition, hypertension is a cardiovascular syndrome and a systemic disease related to metabolism. The function of various tissues and organs in

the body declines, and metabolism is weakened with age, therefore, hypertension can be considered as an age-related cardiovascular degenerative disease

#### **2. Frailty is an age-related disease with complex pathogenesis**

As an age-related systemic disease, frailty has attracted the attention of more and more scholars at home and abroad in recent years, and related research has been launched one after another [9-11]. The survey results show that [10-14] that advanced age is a risk factor for frailty in the elderly. The older, the greater the risk of frailty and pre-frailty. This may be due to the degenerative changes in the functions of the various organs of the elderly with the increase of age, and the continuous reduction of physiological reserves, which leads to the increase of the fragility of the body and more susceptibility to adverse stimuli. The frailty index is obviously related to the level of some inflammatory markers (such as C-reactive protein, interleukin-6, tumor necrosis factor, etc.), and diseases that exacerbate chronic inflammation (such as atherosclerosis, Alzheimer's

disease, etc.) occurs and develops gradually with age[10-15]. Many of the physiological characteristics of frailty, such as decreased grip strength, fatigue, and decreased activity, can be explained by the elevation of inflammatory mediators. Therefore, chronic inflammation is considered to be the most likely pathophysiological mechanism of frailty. In addition, frailty is associated with various chronic diseases, poor neuropsychology such as depression and cognitive impairment, malnutrition, cellular aging, impaired energy metabolism, oxidative stress, neuroendocrine disorders, immune disorders and other factors[12-16].

### **3. Hypertension and frailty share many common pathogenesis**

The onset of hypertension is also related to inflammation, energy metabolism, neuropsychological factors, endocrine and immune disorders, etc. It can be seen that hypertension and frailty have many common pathogenesis mechanisms. Therefore, in theory, patients with hypertension and related diseases are more likely to merge with frailty, and vice versa. Basile et al. found that 80% of elderly hypertensive

patients had frailty, and the systolic blood pressure was negatively correlated with frailty index ( $r = -0.319$ ) by analyzing the relationship between blood pressure and frailty in elderly hypertensive patients[7]. Xue et al.[17] found that patients in the frail group had a higher proportion of carotid intima-media thickening with values of at least 1 mm compared with those in the pre-frail and non-frail groups, and the cardio-ankle vascular index was higher in the frail group than that in the other two groups. The results of Bastos-Barbosa et al[18]. showed that the systolic and diastolic blood pressure of debilitated patients increased throughout the day and during sleep compared with non-debilitated patients, suggesting that elderly patients with debilitating had higher blood pressure. But there are also research reports with the opposite conclusion. Fattori et al[19]. found that there was no significant correlation between hypertension and debilitating phenotypes by analyzing the relationship between blood pressure and debilitating phenotypes in people in southeastern. Moreover, elderly patients with higher frailty phenotype scores

have lower average 24-h systolic blood pressure and 24-h average diastolic blood pressure. However, there are still few academic studies on hypertension combined with frailty. If in-depth research can be carried out, it is expected to reveal more biological mechanisms, which will bring significant benefits to the early identification, clinical diagnosis and treatment of hypertension, frailty, and comorbidities of both.

### Conclusion:

Studies show that hypertension and frailty are complex diseases related to age, and they share many common pathogenesis. However, there are few studies on the relationship between frailty and hypertension, and the conclusions are inconsistent. Therefore, further research is needed to determine the relationship between hypertension and frailty, which can help us further understand hypertension and frailty.

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