

REVIEW ARTICLE

Aging labor force and dementia prevention

Masatoshi TAKEDA, Takenori KOMATSU, Kenji OKA, Takeshi KAMISHIMA

Osaka Kawasaki Rehabilitation University

Correspondence: Masatoshi Takeda, President, Osaka Kawasaki Rehabilitation University, 158 Mizuma, Kaizuka, Osaka 597-0104, Japan. E-mail: masatakeda@kawasakigakuen.ac.jp

Disclosure: There is no conflict of interest to declare.

Key words: aging society, Alzheimer's disease, dementia prevention, employment, labor force

Abstract

Many economically developed countries are facing problems of rapidly increasing elderly population and high number of dementia people. The ratio of elderly people in Japan (65 ears and over) exceeded 7% in 1970, 14% in 1994, and 21% in 2007, 28% in 2019, which will reach 38% by 2050. In 1950, 12.1 working people supported one elderly, but only 2.0 working people supports one elderly. In order to make the society more sustainable, increase in working population is required. One of the effective means will be extension of retirement age, by supplying employment support to the elderly. The prevention or delay of onset of early Alzheimer's disease is not only medical but also societal task of the aged society, and the author will discuss some solutions for this purpose.

INTRODUCTION

It is estimated that Alzheimer's disease (AD) accounts for 60-70% of the approximately 40 million dementia patients worldwide and 6 million in Japan. Alzheimer's disease is closely related to brain aging, and the number of patients is expected to increase with the elongation of life span. As a result, the number of dementia patients is expected to double every 20 years, reaching 115 million worldwide by 2050. Alzheimer's disease is the most malignant disease to be conquered in the 21st century because of the large number of patients, the long duration of the disease, and the severity of the disability. It is the biggest challenge for modern medical science to tackle, and efforts are being made to develop a cure for the disease, however, the goal is not yet in sight.

In order to cope with this situation, developed countries are taking national strategy against dementia, such as the UK's National Dementia Strategy and the US's National Alzheimer's Programme. In Japan, where the population is aging at the fastest pace in the world, the National Dementia Strategy was published in June 2019 with the aim of realizing a society in which people with dementia can continue to live in their own way as long as possible in a good local environment. The basic concepts are "prevention" and "coexistence," and it is stated that the measures should be promoted while emphasizing the perspectives of people with dementia and their families, aiming to delay the onset of dementia and create a society where people with dementia can live their daily lives with hope.

AGING OF JAPANESE SOCIETY

The aging of Japanese society is progressing rapidly: the ratio of people aged 65 and over exceeded 7% in 1970, 14% in 1994, and 21% in 2007; the elderly population aged 65 and over in 2019 is about 36 million (15.6 million men and 20.29 million women), with the aging rate of 28.4%.

Japan's total population is in the process of declining, but the number of the elderly people will keep increasing as the baby boom generation becomes elderly, and the aging rate will continue to rise, reaching 33.3% in 2036, or one out of every three people. From 2042 onwards, the aging rate will continue to rise even as the number of the elderly people begins to decline, and it is estimated that the rate will reach 38.4% in 2050, with one in every 2.6 citizens the elderly.

If the rate of people aging is slow, the social distortions are small and manageable, but the aging of Japanese society is progressing more rapidly than in Western countries, where the transition has been slow over 50 to 100 years, resulting in major social distortions.

As shown in Figure 1, in 1950, 12.1 working population (aged 15-64) supported one elderly person, but in 2020, 2.0 working population will support one elderly person, and in 2065, 1.3 working population will support one elderly person.

SUSTAINABLE SOCIETY AND EXTENSION OF RETIREMENT AGE

Until now, Japanese society has been managed by lifetime employment and the mandatory retire-

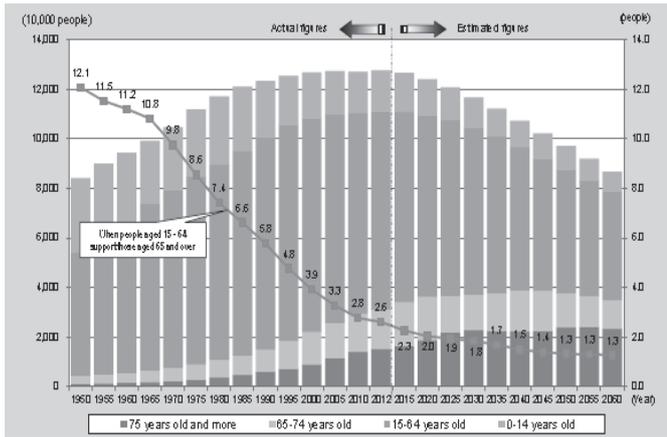
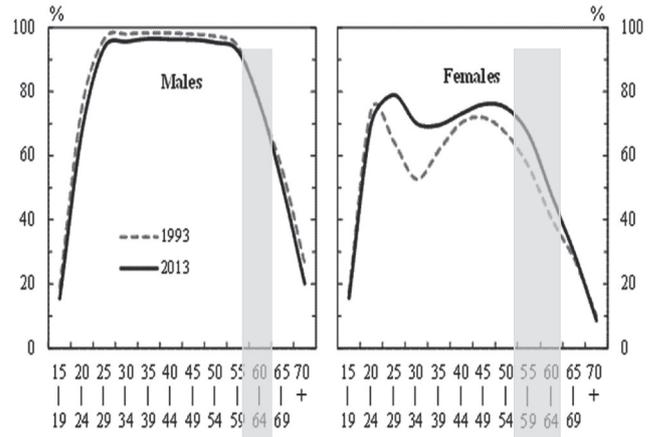


Figure 1. Population of Japan by 0-14, 15-64, 65-74, and 75 years and over, and the change in ratio of 65 years old and over/ 15-64 years old.



Source: Statistics Bureau, MIC.

Figure 2. Employment ration of Japanese people by age and gender.

ment system. The working population declined rapidly because of the mandatory retirement system, and after retirement, the public pension system is expected to guarantee a comfortable life. In fact, the employment rate for men declined sharply after the age of 60, and for women, although the employment rate for those aged 15-64 being around 70%, it declined sharply after the age of 55 (Figure 2). It goes without saying that a super-aged society is unsustainable under such a rigid system. In order to sustain the economic activities of society, it will be necessary for many elderly people to continue working and participating in social activities.

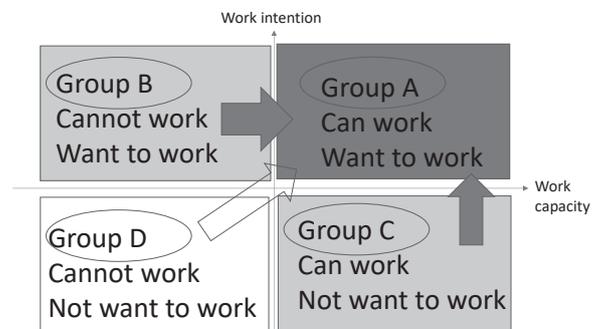
This social demand has led to the adoption of measures to extend the retirement age, and the employment rate of the elderly in Japan has slowly increased. In 2019, the rates rose to 49.5% for those aged 65-69, 32.5% for those aged 70-74, and 10.3% for those aged 75 and over, but these increases are slow and insufficient to support a super-aged society.

According to the 2020 edition of the White Paper on Aging, approximately 40% of those aged 60 and over who are working intend to continue working as long as they can, and when combined with those who intend to work until the age of 70 or older, approximately 90% of them are highly motivated to work even in their old age (Japan Ministry of Health and Labor, 2021).

EMPLOYMENT SUPPORT FOR THE ELDERLY

Considering the economic and social activities of Japan’s super-aged society, one solution is to support elderly people who are willing to work. Figure

3 shows a diagram of the four groups by ability and willingness to work. In a super-aged society, the goal should be to increase the number of elderly people who have the ability and desire to work, as shown in Group A. To increase the number of elderly people who have the desire to work but are not working, as shown in Group B, it can be achieved by changing the social system and extending the retirement age. In addition, the elderly who have the ability to work but do not want to work, as shown in Group C, need to be educated that maintaining social activities, including work, is useful for preventing dementia and extending healthy life expectancy. The majority of the elderly who do not have the ability or desire to work, as shown in Group D who are unable and unwilling to work are due to physical illness, or mental problems, but dementia accounts for a significant portion of these problems.



B to A; change social rules, banning retirement by age
 C to A; education of active life
 D to A; many things can be done by psychogeriatric specialists

Figure 3. Four groups of people categorized by working capacity, and intention.

YOUNG-ONSET AND OLD-ONSET ALZHEIMER'S DISEASE

Alzheimer's disease, which accounts for 60-70% of all dementia cases, can be classified into two types: the elderly-onset type (onset age 65 years or older) and the young-onset type (onset age less than 65 years). Because the incidence of Alzheimer's disease increases with age, the majority of cases are the elderly-onset type, and the proportion of young-onset cases is small. However, the young-onset type of the disease occurs at an age when people are expected to be in the labor force and progresses at a rapid rate, resulting in significant socioeconomic losses. It is known that many cases of the young-onset type of Alzheimer's disease are caused by genetic factors. Another major characteristic of the young-onset type is the variety of symptoms.

DIVERSITY OF ALZHEIMER'S DISEASE

Alzheimer's disease is a disease that impairs social life due to memory and cognitive impairment characterized by amyloid deposition, neurofibrillary changes, and synaptic loss. Atypical Alzheimer's disease presents with a wide variety of symptoms in addition to these basic symptoms. Atypical Alzheimer's disease accounts for about 5% of cases in old-onset patients, whereas it is reported to account for 20-30% in young-onset patients.

In recent years, brain imaging techniques are well-utilized in clinical settings such as amyloid PET and diagnostic methods using biomarkers has enabled the early diagnosis of Alzheimer's disease, which has called for more attention to atypical Alzheimer's disease. Originally, Alzheimer's disease was clinically diagnosed as dementia after subjective cognitive impairment (SCI) or mild cognitive impairment (MCI) from normal brain aging, and is a continuous

spectrum from normal cognitive function. Based on this understanding, recent development of drugs for Alzheimer's disease has focused on whether or not to delay the onset of Alzheimer's disease in high-risk groups of patients with dementia in a state before the onset of clinical symptoms. Theoretically, preclinical Alzheimer's disease includes atypical Alzheimer's disease, and the significance of atypical Alzheimer's disease is a major research theme in these days. Based on a review of clinical reports to date, atypical Alzheimer's disease can be classified into the four categories listed in Table 1.

DEMENTIA PREVENTION AND COGNITIVE RESERVE

The amyloid cascade hypothesis has been proposed to explain the pathogenesis of the basic pathology of Alzheimer's disease (i.e., amyloid deposition, neurofibrillary changes, and synaptic loss). This hypothesis proposes that the deposition of amyloid-β protein in the brain induces tau protein pathology, synaptic damage, and neuronal abnormalities, resulting in a decline in cognitive function. The senile plaques caused by amyloid deposition, neurofibrillary changes as tau pathology, and neuronal loss generally correlate with the degree of cognitive impairment. However, in many individual cases, the three features of Alzheimer's disease do not necessarily correlate with the degree of cognitive impairment. Against this background, the concept of cognitive reserve has been proposed to explain the discrepancy between the pathology of Alzheimer's disease and cognitive decline. Cognitive reserve is thought to be the ability to maintain cognitive function in the face of brain aging and Alzheimer's disease pathology, but its biological nature remains to be elucidated (Takeda, 2020a).

Table 1. Subtypes of Atypical Alzheimer's disease

Aphasia type	Language difficulty is in the foreground of symptoms, which overlaps with those called logopenic aphasia(PLA)
Posterior Cortical Atrophy type	Visuospatial difficulty is the initial symptom, previously know as Posterior cortical atrophy(PCAs)
Fronto-temporal type	Behavior disturbance due to frontal dysfunction, called Behavioral variant AD
Corticobasal degeneration type	Motor dysfunction of the upper limbs with significant difference right-left hands, previously called Corticobasal Degeneration

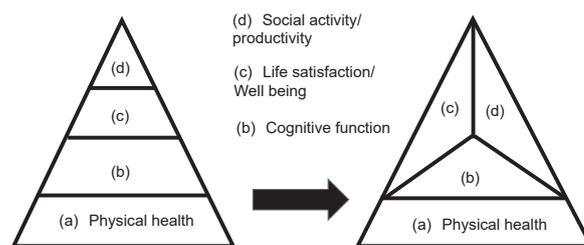


Figure 4. Interrelationship among cognitive function, well-being, and social activity. Above (a) physical health, which is a *sine qua non* for (b), (c), and (d).

Previously, cognitive function was considered to be a requirement for social activity and life satisfaction in a pyramidal structure as shown on the left side of Figure 4, but more recent studies have revealed that cognitive function, life satisfaction, and social activity are interrelated and related to each other (Takeda, 2015). Considering these conditions, factors that may explain cognitive reserve include 1) younger age, 2) male, 3) educational background, 4) work, 5) hobbies, 6) exercise habits, 7) interaction with others, 8) social participation, 9) purpose in life, and 10) social contribution (Takeda, 2020b).

This paper is supported by Grants-in-Aid from JSSP to MT (19K08057) , TK (20K07932), and TK (21K11279).

REFERENCES

- Japan Ministry of Health and Labor, 2021 White Paper on Aging Society, Cabinet Office, 2021
- Takeda M Cognitive reserve and dementia prevention. *JPN J Clin Psychiat* 49(5), 573-582, 2020a
- Takeda M, Shen W The hypothesis of cognitive reserve. *Taiwanese J Psychiatry* 29(2), 70-79, 2015.
- Takeda M, Terayama K, et al. Cognitive reserve and cognitive rehabilitation. *Cognition & Rehabilitation* 1, 4-7, 2020b