

Changes in the Structure of Diseases and Causes of Death in Japan in Modern and Contemporary Times and Their Relation to Physical Therapy

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Abstract

In the second half of the 20th century, deaths in infants and young adults gradually became rare in Japan and non-communicable diseases (NCDs) after the age of 40 became the main cause of death. To prevent premature deaths from NCDs, known as adult-onset diseases in Japan, the government promoted screening for cancer and other adult-onset diseases for early detection and treatment as secondary prevention measure. At the end of the 20th century, though average life expectancy considerably increased, a new policy were put in place to extend it further emphasising the importance of lifestyle modification as a primary prevention measure to prevent NCDs. NCDs were redefined as lifestyle-related diseases and measures were promoted as 'Healthy Japan 21', with specific targets for improvements in smoking, diet and exercise. As a result, average life expectancy has increased to just over 80 years for men and just under 90 years for women, and Japan is now considered in a super-aged society. The current challenge is to maintain and improve the physical functions of older people with frailty syndrome as tertiary prevention, whose physical functions have declined with age, tending to be ridden with mal-nutrition and easily to die from pneumonia and other causes. In terms of physiotherapy's involvement in the three phases of era of NCDs: adult-onset disease, lifestyle-related disease and frailty syndrome, rehabilitation for stroke, which was common in the adult-onset disease era, came first, followed by involvement in exercise therapy for metabolic syndrome in the lifestyle-related disease era, and in frailty syndrome, rehabilitation to prevent age-related decline in physical function and to maintain sociality. In the case of frailty syndrome, physiotherapy has come to play an increasingly important role in preventing age-related decline in physical function, maintaining social skills and maintaining a high quality of life. In the era of frailty, more advanced medical knowledge is required to treat older people with underlying conditions, and closer collaboration between the medical professions and the support system becomes essential.

Introduction

After World War II, Japan gradually caught up with developed Western countries in the field of healthcare along with its economic recovery and is now one of the first countries to enter the super-aged society. During this period, Japan has moved from the era of infectious diseases to the era of non-infectious diseases, life expectancy has gradually increased and the focus of government healthcare policy has changed along with the main causes of death. Even during NCDs era, the role of physiotherapy has also shifted from a focus on medical rehabilitation for recovery from specific diseases such as fractures and strokes to include exercise therapy for health promotion and, more recently, preventive physiotherapy as a frailty measure to prevent muscle weakness and malnutrition in the elderly are becoming increasingly important [1,2]. The study aimed to identify the relevance of physiotherapy in a broad sense to the evolution of preventive measures in the post-war Japan.

History of medicine and physical therapy in modern Japan up to the mid-20th century

The Meiji Era began in 1968 with the Meiji Restoration and the modernisation of society was promoted under the influence of western countries. Though western medicine was actively introduced and gradually replacing the Chinese medicine (Kampo) that had advanced independently in Japan, including acupuncture

and acupressure, Western medicine and Japan's own ethnic medicine continued to mix even after the World War II [3,4]. Judo therapy, among other Japanese ethnic medicines, developed from Chinese osteopathy, was widely used as a rehabilitation option for fractures and dislocations [5,6].

Towards the end of the infectious disease era

In the 1947, two years after the end of the war, the survival curves still show a sharp decline due to deaths of infants under the age of five and a gradual decline due mainly to deaths from tuberculosis after the age of 20, which may have contributed to the short life expectancy indicated by the area enclosed by the survival curve (Figure 1). Under the US-led GHQ led by General MacArthur, antibiotic control of infectious diseases, significant improvements in maternal and child health, and progress measure against tuberculosis led to a marked

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decline in infant and young adult deaths as shown in curves of 1955, and the curves of 1975 showed that of typical of developed countries with little decline in survival numbers below the age of 40, and only after the age of 40, and only after the age of 40, survival curves declined gradually, then sharply, and finally declined again gradually to almost zero at the age of 100.

The importance of rehabilitation was also recognised gradually through the rehabilitation of wounded soldiers. From the 1960s onwards, rehabilitation became an integral part of TB care, focusing on restoring lung function and improving patients' overall quality of life, offering structured pulmonary rehabilitation programs, including respiratory exercises and physical conditioning [7,8]. In 1957, the orthopaedic society proposed the necessity of training of physiotherapists and occupational therapists, and, in 1965, both became national qualifications [9]. On the one hand, traditional Japanese medicine continued to exist under the public healthcare system [10].

Era of adult-onset diseases

As a result of a marked reduction in mortality among children and young adults and an increase in life expectancy, deaths from NCDs, which gradually increase over the age of 40, became more noticeable. Especially, premature deaths at 40s and 50s due to stroke, myocardial infarction and cancer, noticed as three leading cause of death in this period.

As seen in Figure 1, with the decline in tuberculosis and pneumonia among young people, cerebrovascular disease has risen to the top of the list of causes of death. The content of cerebrovascular disease has gradually shifted from intracerebral haemorrhage, which is thought to be caused by malnutrition in an era of food shortages, to cerebral infarction, which is caused by the metabolic syndrome of over-nutrition. In any case, stroke often results in death due to the decline in ADL caused by impairment of physical functions rather than immediate death, leading to bedridden state and continued need for care, and the importance of rehabilitation to prevent this is thought to have started to be recognised at this time [11]. While mortality from

other NCDs, such as cancer and heart disease, has increased as life expectancy has risen, stroke has fallen to third place behind cancer and heart disease as it has declined with the spread of hypertension treatment and improved diets [12].

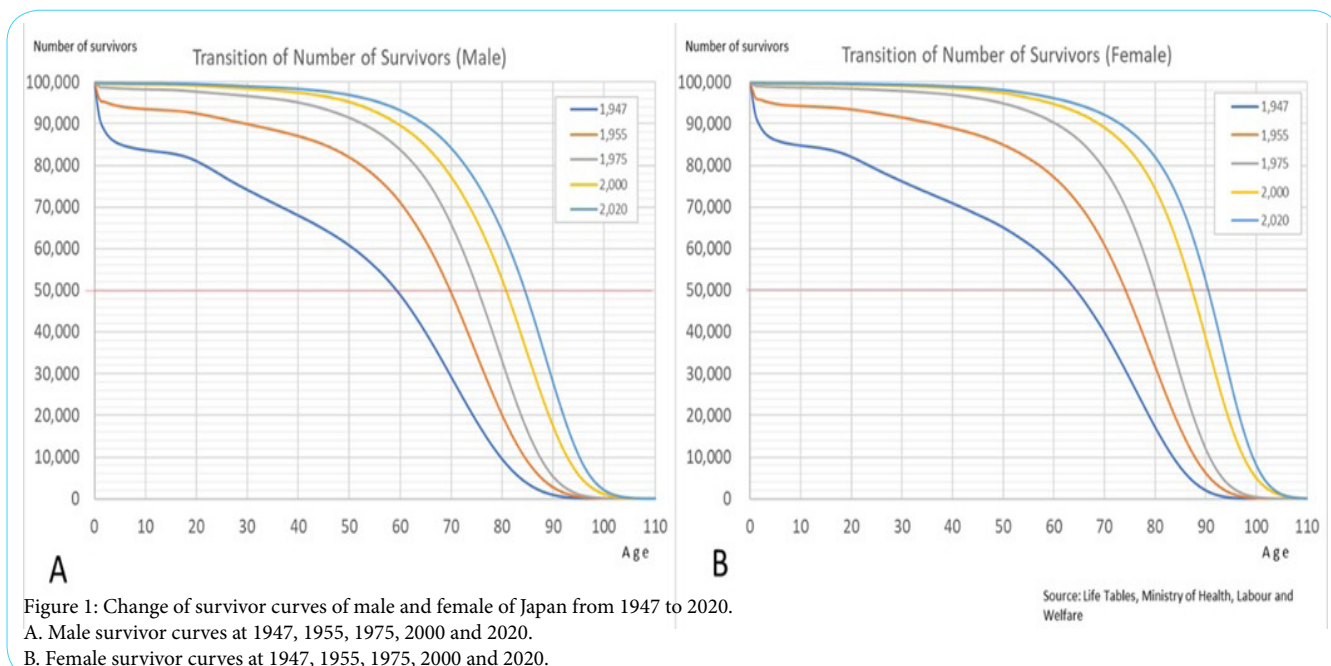
Adult-onset diseases, NCDs in WHO's term, began to be mentioned in Japan from around 1960, with increase of deaths in the 40s and 50s from stroke, cancer and heart disease began to be noticed with, and from around 1970 the government began to actively take measures against adult diseases. In 1985, the Geriatric Health Act was enacted, and measures centred on secondary prevention aimed at early detection and early treatment, such as screening for adult-onset diseases and cancer for people aged 40 and over [13].

The Total Health Promotion Plan was proposed by the Ministry of Labour in 1988, urging large companies to improve the health promotion of their employees, it is a system that requires doctors to issue exercise prescriptions at the time of medical check-ups, and to provide exercise, nutrition, mental health, and overall health guidance internally and autonomously [14]. Particular emphasis was placed on the role of the health and exercise instructors, who create specific programmes for exercise, and the health and exercise practice leaders, who are responsible for direct exercise instruction.

Era of life-style related diseases

Average life expectancy continued to increase at the end of the 20th century, and a new policy to extend it further emphasised the importance of lifestyle modification as a primary prevention measure to prevent NCDs. In order to emphasise the importance of improving lifestyle habits, NCDs were redefined as lifestyle-related diseases and promoted as 'Healthy Japan 21', with specific targets for improvement in smoking, diet and physical activity [15].

Myocardial infarction and cerebral infarction occur due to the progression of arteriosclerosis, and it is believed that metabolic syndrome, which includes visceral obesity, diabetes, dyslipidemia, and hypertension, plays a role in this process. In order to intervene



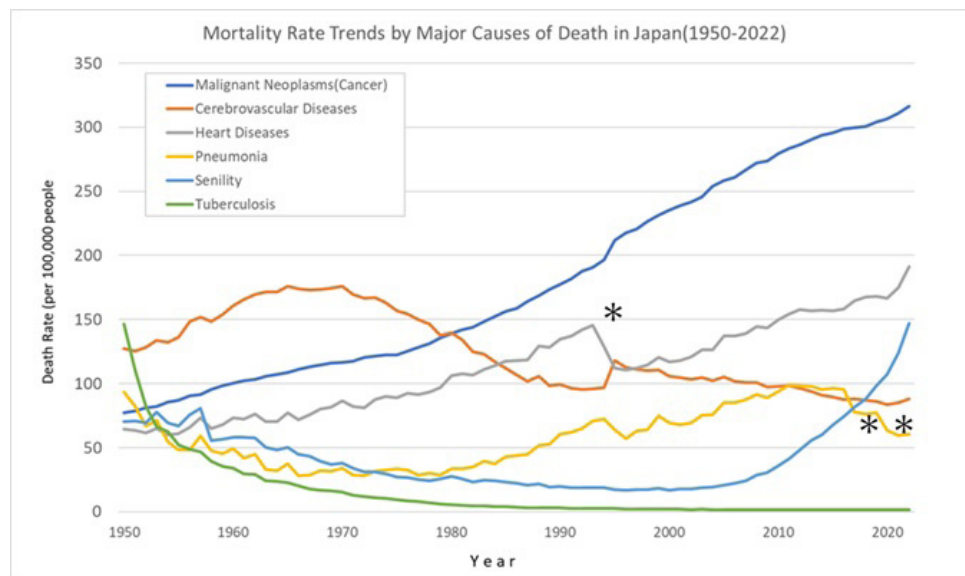


Figure 2: Mortality rate trends by major causes of death in Japan from 1950 to 2022.

*With the adoption of ICD-10 in 1995, Japan also changed its criteria for determining cause of death, leading to significant discrepancies before and after the change, particularly in cardiac disease.

** Aspiration pneumonia was made independent of pneumonia as a cause of death in 2017, so there appears to have been a subsequent decline in pneumonia. Taken together, the increase has continued and is now almost equal to that of senility.

early, before these conditions are specifically diagnosed as diseases, specific health check-ups and guidance, including exercise instruction as physiotherapy, are provided through the public healthcare system to address metabolic syndrome.

The idea of Disability-free life expectancy (DFLE) has been also introduced in Japan, and the importance of not only living longer but also enjoying life maintaining a high QOL has come to be emphasised. In particular, the issue of bedridden patients after leg fractures has begun to attract attention to early rehabilitation to prevent bedridden after fractures, in addition to the prevention of osteoporosis and falls.

Now as the Era of Frailty Syndrome

In the 2020s, life expectancy has increased to over 80 years for both men and women, with the majority of deaths occurring in the later years of life in the 80s and 90s. Deaths from vital organ failure due to ageing, including chronic heart failure, chronic kidney disease and especially, multiple organ failure from senility, is rising to the top of the list of leading causes of death. Pneumonia, which does not lead to death in younger people, often leads to respiratory failure and death in the elderly due to a decline in their original respiratory function and reduced healing capacity. Deaths due to COVID-19 also occur mostly in the elderly over 80 years of age. Aspiration pneumonia also occurs frequently in the elderly due to bed-ridden and impaired swallowing function, and accounts for nearly half of all pneumonia deaths. Therefore, while it is necessary to continue efforts to promote medical screening as secondary prevention, as in the era of adult diseases, and lifestyle modification as primary prevention, as in the era of lifestyle-related diseases, the most important issue is to take direct action against the elderly aged 70 and over who are actually dying. These older people have already begun to lose physical function by aging, resulting in a condition called frailty syndrome, and the vicious circle of reduced physical function, mobility, socialisation, loss of appetite, malnutrition and further decline in physical function,

which Fried et al. call the frailty cycle, needs to be broken, and the role of physiotherapists and occupational therapists, along with that of nutritionists, is also important [16].

Although there was a period of interruption due to the Covid 19 epidemic, local authorities are also bringing older people together to promote exercise therapy with physiotherapists, occupational therapists and exercise instructors, and dietary therapy with dieticians [17].

Discussion

Table 1 summarizes the evolution of main health issues and measures since the second half of the 20th century, divided into periods and including the relationship with physiotherapy. Japan entered the era of non-communicable diseases around 1970, when deaths from infectious diseases in infants and from pulmonary tuberculosis and pneumonia in young people almost disappeared, but can be divided into three sub-eras according to the main issues and changes in measures taken to date.

The first sub-era is the era of adult-onset diseases, which include hypertension, hyperlipidemia and diabetes together with the three main causes of death - stroke, myocardial infarction and cancer, and efforts were made to promote screening for adult-onset diseases and especially screening for cancer, with the aim of early detection and early treatment, which is secondary prevention as an adult disease.

The second, starting from 21 century, is the era of life-style related diseases, for which the emphasis was on lifestyle modification as primary prevention.

The third is the age of frailty syndrome, which is currently under way, and the countermeasure is to break the vicious cycle of frailty.

Era	Sub-Era	Main Target	Prevention Phase	Preventive Measure	Specific contents	Physical Therapy
Infectious Diseases		Before about 1970	infants and young adults	Primary and Secondary	Immunisation, Antibiotics, Sanitation	Pumonary rehabilitation for TB, Fructure rehabili
NCDs	Adult-Onset Diseases	Approximately 1970-2000	40s and 50s	Secondary	Adult Health Screening, Cancer Screening	Stroke rehabilitation
	Life-Style Related Diseases	From around 2000 to 2020	From young to old	Primary	Exercercise, Nutritional management, Smoking cessation	Exercise therapy for lifestyle related diseases, Bedridden prevention
	Frai Syndrome	Very recent years	70 years and over	Tertiary	Nutrition, Exercise, Social participation	Muscle strengthening, Stabilitation of physical balance, Social rehabilitation

Table 1: Preventive medicine chronological divisions, main means of prevention and relationship with physiotherapy. Period divisions are approximate. For each sub-period, a main concept is raised as a preventive measure with some specific contents. As for physical therapy, it raises the characteristic ones that have begun to attract attention since that period.

The role of physiotherapy has changed with the times, but the current era of frailty syndromes has also seen an increasing emphasis on the role of maintaining and promoting physical function in all phases of primary, secondary and tertiary prevention.

Although The average life expectancy in 2024 is 85.1 years, and healthy life expectancy without daily life limitations is 72.7 years for men and 75.4 years for women, both world-leading lengths, a major present challenge for preventive medicine is to take effective measures against the frailty syndrome in the over-70s, whose physical functions are already declining even before they require nursing care or medical treatment, in order to increase healthy life expectancy and reduce the gap between life expectancy and healthy life expectancy.

The long-term care insurance system introduced in 2000 provides elderly people in need of care with services provided by home helpers and nurses for daily living support, as well as rehabilitation by physiotherapists, but does not adequately address preventive services for the relatively healthy elderly [18]. In order to break the vicious cycle of Frailty, there is a need to improve the system of health promotion through exercise and nutritional interventions for older people before they require care.

In our super-aged society, it is now more highly valued not only to live longer, but also to live with a high quality of life. Even in the final stages of cancer and neurological diseases, it is important to be able to enjoy life while pain is controlled by medical treatment, and physiotherapy is increasingly being called upon to play a role in this context. Therefore, both physiotherapists and occupational therapists are required to have more advanced medical knowledge and skills, and there is a growing need to work closely with other specialists including doctors, nutritionists, sports trainers.

The fight against NCDs is starting to become an important issue in developing countries [19]. In addition, Japan was one of the first developed countries to enter the super-aging society, and the role of physiotherapy in the fight against NCDs in Japan is attracting attention from around the world [20].

Conclusion

We summarized the chronological change of disease structure and physiotherapy. And also the health workers are expected to play the current role of rehabilitation and prevention of diseases and disorders in Japan.

Competing Interests

The authors declare that they have no competing interests.

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