Implications of Research Findings Obtained from Centenarians

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Abstract: The number of centenarians in Japan has increased more than a hundred times over the past four decades, reaching nearly 20,000 persons currently. The rate of centenarians in the population is higher in the western part of Japan, where mortality from stroke is low. Centenarians generally have nutritionally well-balanced diets that are rich in animal food and vegetables. They tend to be extroverted, optimistic, hard working, and scrupulous. A recent national survey on centenarians revealed that they have a positive view of their health status, although the degree of independent functioning in activities of daily living is low.

Key words: Long life; Lifestyle; Quality of life

Introduction

According to the author’s research, the longest-lived person in Japan has reached the age of 116 years. Although some records of longer-lived individuals have been found, they all tended to be flawed for one reason or another. Since Japan has an excellent system of census taking, reports of the existence of very long-lived individuals in other societies also are unlikely to be trustworthy. In fact, it was revealed by a US research group that not a single centenarian had been found in Vilcabamba, an Ecuadoran city in South America, which has been considered one of the world’s three main areas of longevity. The Caucasus, another of the areas famous for its inhabitants’ longevity, can also be ruled out, because the demographic statistics of the former Soviet Union were problematic.

Thus, according to reliable statistics, the human life span appears to be less than 120 years. Therefore, centenarians are those who have lived nearly to the limit of the human life span, and their existence provides hope for the longevity of humankind. In Japan, several national surveys on centenarians have been carried out, in addition to various regional surveys. A review of such surveys has been reported by Shinkai, who indicated the direction of future research.

Most of the previous studies of centenarians...
were case studies that attempted to determine factors involved in longevity. However, the project known as the national cross-sectional study of 1/2 samples of centenarians, which was part of the study on regional systems to aid the elderly in maintaining or improving daily living and to promote participation in social activities, focused on the quality of centenarians’ lives. In this study, which was conducted under the Ministry of Education, Culture, Sports, Science and Technology, the author and other researchers attempted to address the day-to-day needs of the elderly.
Historic Changes and Geographic Distribution of Centenarians

Figure 1 shows changes in the number of centenarians in Japan.\(^7\) Statistical data on centenarians became more accurate after 1963, when the Old-Age Persons’ Welfare Law was enacted on their behalf. The latest data show that centenarians total nearly 20,000 individuals, representing more than a 100-fold increase from 1963. Interestingly, despite this dramatic increase in centenarians, there has been no tendency for the upper age limits to increase, and no one has exceeded 116 years of age. The highest age of centenarians has remained about 110 years, with little change over the years.\(^7\) This underscores the author’s view that the outer margin of longevity for humans is about this level.

The geographic distribution of centenarians in Japan shows that the western part of the country fares better in producing them.\(^7\) The distribution of centenarians shows an inverse correlation with mortality from stroke, and, in relation to longevity, there is a closer correlation with mean life expectancy at age 65 than that at age 0. When comparing the distribution of centenarians according to prefecture, the rate of centenarians to the total prefectural population is often used, but, for fair compari-
son, this measure requires adjustment by the rate of individuals over the age of 65. Therefore, use of the rate of centenarians to the prefectural population of those 65 years old or older is appropriate. Figure 2 shows the rate of centenarians to the population of those 65 years old or older by prefecture in 1999, according to our calculations. The number of centenarians per population of 100,000 aged 65 or older was highest in Okinawa (202.8), followed by Kochi (113.4), Kumamoto (92.7), Shimane (91.4), and Kagoshima (82.7). At the other end of the spectrum, the corresponding rate was lowest in Saitama (31.9), Aomori (32.1), Ibaraki (34.7), Shiga (35.9), and Akita (36.5).

An analysis of factors determining the geographical distribution of centenarians yielded interesting results. There was a strong correlation between average temperature and the rate of centenarians \( (r = 0.740, p<0.001) \). However, the rate of centenarians was higher in Hokkaido, where the average temperature was lowest, than in the entire Tohoku area, indicating that the outside temperature is not necessarily a decisive factor. Although there was an inverse correlation with total calorie intake at 60–69 years of age, it may be premature to associate calorie restriction with long life, considering the fact that average height is greater in eastern Japan. The proportion of animal protein to total protein intake in persons in their 60s showed a significant positive correlation with the rate of centenarians. However, this index has a geographical distribution similar to that of temperature, so that careful multivariate analysis may be necessary before causality can be discussed.

**Dietary and Lifestyle Habits of Centenarians**

Our national survey carried out in 1972 and 1973 provided a detailed inquiry into the eating habits of centenarians for the purpose of nutritional analysis. Probably because centenarians had a smaller physique and were less active, total daily calorie consumption was 1,073 kcal for males and 939 kcal for females, about half the corresponding totals for the general Japanese population. Data on the overall Japanese population were derived from the 1972 National Dietary Survey. Interestingly, as shown in Fig. 3, the rate of calories derived from protein to total calories was higher in centenarians than in the general population.
Namely, they consumed a low-calorie, high-protein diet. More surprisingly, the proportion of animal protein to total protein intake in centenarians was much higher than that in the general population (Fig. 4). These data indicated a diet almost opposite to a vegetarian diet. When data collection was limited to centenarians with good memory function, we found that their eating habits before the war were similar to those of the general population, indicating that these centenarians altered their eating habits after reaching their middle 70s, almost as if they took the lead in the westernization of Japan’s eating habits.

The tendency of centenarians to adopt positive, well-balanced eating habits has also been demonstrated by survey research conducted by the Japan Health Promotion & Fitness Foundation.8) The 1993 survey by this foundation included the exercise habits of centenarians.9) The centenarians lived through the era dominated by the nation’s policy of increasing wealth and military power, and their occupational life chiefly consisted of physical labor. Therefore, it is presumed that they began to exercise for pleasure only after retirement. In the 1993 survey, 52% of centenarians replied that they exercised, and 43% of them replied that they exercised daily. Specifically, “walking” was predominant for both men and women, followed by “field labor/weeding/caring for plants”, “gymnastic exercise”, and “work”. Compared with centenarians who had no regular exercise, centenarians who engaged in regular exercise were better in activities of daily living (ADL), showed more interest in hobbies, associated more actively with friends, and had eating habits that were improved from those in middle age.

According to our most recent survey on centenarians, 63.8% of male centenarians and 93.2% of female centenarians were never smokers. However, 30.7% of males and 6% of females were past smokers, and 5.6% of males and 0.8% of females were current smokers.6)

With regard to alcohol consumption, 45% of males and 77.6% of females were never drinkers, whereas 31.1% of males and 14.9% of females were past drinkers, and 21.9% of males and 5.8% of females were current drinkers. Thus, habitual drinking was more common than habitual smoking, consistent with data from previous studies on long life in various parts of the world.

Characteristics and Personalities of Centenarians

In our survey, data on the characteristics of 80 centenarians in their younger days were obtained mainly from their families. It was found that they tended to be extroverted (81.2%), cheerful and friendly, and optimistic, while they were also hard workers and scrupulous.10) A national survey carried out later in 1975 also revealed similar features.11) However, it is unclear to what extent these character and personality traits are peculiar to centenarians.

Quality of Centenarians’ Lives

Our recent study of centenarians provided a better understanding of the quality of their lives.6) Many of them had a decreased current level of functioning. In fact, 22.2% of men and 41.1% of women fell under the category of “bedridden”. This, however, is understandable: nearly one-half of the centenarian population is replaced every year, indicating that those in the terminal stage of life accounted for a considerable proportion at the time of investigation. However, it is apparent that they have led an independent life for most of their existence, with only a few people bedridden for a prolonged period. Therefore, they have a generally good view of their health status. As shown in Fig. 5, as many as 74.7% of men and 62.5% of women feel that they are in good health. Those who had a hobby accounted for 46.6% of men and 26.9% of women, which seemed to be correlated with the degree of independent
functioning in life. A total of 43.6% of men and 25.8% of women found their lives worth living, whereas 28.4% of men and 33.6% of women did not; 27.9% of men and 40.6% of women were unclear. It is difficult to obtain accurate answers from centenarians with intellectual impairment.

Understandably, few centenarians participate in social activities. Only 20.5% of men and 11.6% of women are involved in activities such as work and volunteer service. However, such active centenarians accounted for a relatively high proportion among those who are functioning independently in life.

The presence of centenarians contributes to society through their embodiment of human longevity, their role as living witnesses to history, and their ability to transmit wisdom to the next generation. The 21st century is a time of mutual cooperation, in which the contribution of the elderly to society is indispensable, as is the support of the younger generation in caring for society’s elders. The contribution made by the elderly to society is broad in scope, and the way centenarians contribute to society has great significance.

REFERENCES