

Number of missing teeth by birth year in a Japanese population

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Abstract : The purpose of this study is to analyze the change of Missing teeth (MT) recorded in the Japanese National Survey of Oral Health by birth year cohort. In the results of the birth year cohort, the MT showed to be decreasing year by year during about 50 years. It reveals that many teeth remain in the mouth of the elderly.

It was suggested that MT have the possibility of index to estimate the oral health of the elderly and the outcome of total oral health system through a life.

Key words : missing teeth (MT), birth year cohort, Japanese National Survey of Oral Health

Introduction

Japan is unique among the super-aging societies worldwide due to its rise in average lifespan and the rapid growth of its elderly population¹⁾. The emergence of this super-aging society can be explained by the decline in the birth rate due to fewer people getting married, as well as the extended average lifespan due to advances in the field of medicine and better preservation of the environment. The proportion of elderly in Japan is the highest in the world, with elderly persons 65 years or older estimated to comprise 23.1% of the

total population as of September 2010²⁾.

For such a super aging society, few studies have been conducted on dental status in Japan³⁾. The correlation between lifespan and the number of residual teeth has been reported^{4, 5)}. The most important implication of these investigations for future dentistry was that the more residual teeth, the longer the lifespan. This significant evidence reaffirms the value of dental care.

The present study aimed to investigate the frequency of missing teeth in Japanese society based on a birth year cohort analysis using Japanese national survey data.

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Materials and Methods

Values for decayed missing filled teeth (DMFT), decayed filled teeth (DFT), and missing teeth (MT) recorded in nine Japanese National Surveys⁶⁾ conducted at 6-year intervals between 1957 and 2005

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were used for the birth year cohort analysis. Subjects older than 5 years of age were divided into age groups at 6-year intervals, and the values in each age group recorded every 6 years in the National Survey were analyzed as a birth year cohort. There were a total of 15 birth year groups: 1905-1910, 1911-1916, 1917-1922, 1923-1928, 1929-1934, 1935-1940, 1941-1946, 1947-1952, 1953-1958, 1959-1964, 1965-1970, 1971-1976, 1977-1982, 1983-

1988, and 1989-1994. MT in each group was evaluated to calculate the average value for each 6-year period. Changes in MT and DFT in each birth year group were analyzed.

Results

Changes in DMFT, DFT and MT in the results of the 2005 Japanese National Survey are shown in Fig. 1. DMFT increased with age. DFT tended to

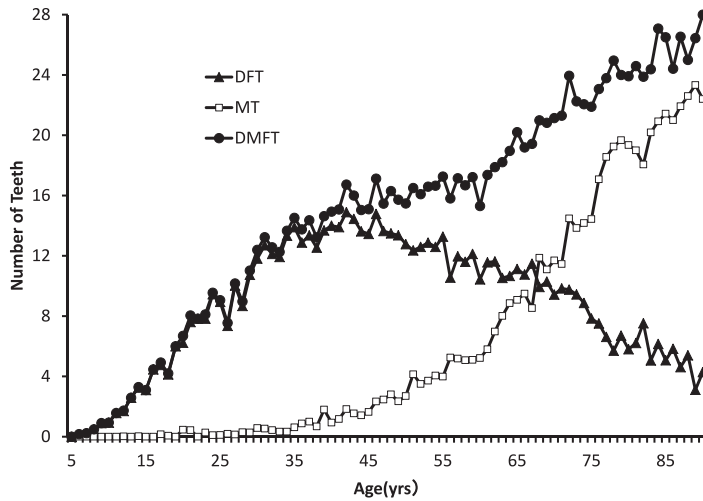


Fig. 1 DMFT, DFT and MT with age in the results of Japanese national survey at 2005

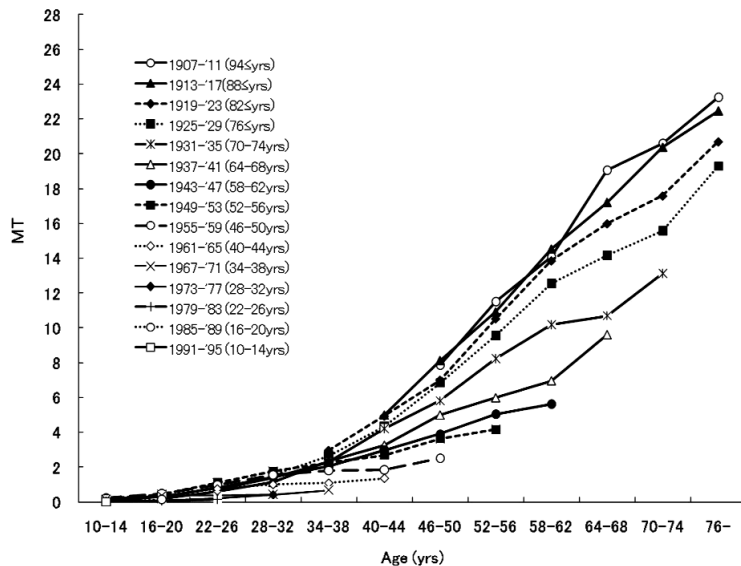


Fig. 2 Change of MT with age as a function of birth year

increase from 6 years of age to around 40 years of age, then decreased after 40 years of age. MT increased exponentially after 35 years of age. The association between DMFT, DFT, MT and age was observed in every result of the past 10 Japanese National Surveys.

Changes in MT revealed by the cohort analysis based on birth year are shown in Fig. 2. MT increased with age from 40 to 80 years of age in people born before 1945. The average number of MT was 20 in people born between 1907 and 1911, and nearly 10 in those born between 1937 and 1941. MT decreased by 10 over the course of 40 years. However, MT did not decrease in people born after 1945 compared to those born before 1945.

Discussion

MT in the Japanese population showed a tendency to decrease in younger as compared to older generations in our analysis of the birth year cohort. It is generally considered, based on the results of cross-sectional surveys, that teeth are lost with age. However, it was clear that the

younger generation of Japanese had more remaining teeth, though the older generation lost teeth with age.

The “8020 Campaign”, which aims for 20 remaining teeth at 80 years of age, is currently being promoted in Japan. The Japanese National Survey held in 2005 indicated that the number of remaining teeth at 80 years of age was 10. The results of our study suggest that it should be possible to achieve the goal of the 8020 Campaign in the future.

We attempted to estimate which generation would achieve this goal and approximately when. Multinomial expressions ($y = ax + bx^2 + c$; y : missing teeth, x : age) were calculated from the MT data for each generation. The estimation curve in a typical generation is shown in Fig. 3 (1), people born around the 1910s; (2), 1950s; (3), 1960s). The values for a , b and c in the equation $y = ax + bx^2 + c$ for (1), (2), and (3) were: a , 2.789, 0.049, 0.111; b , -0.016, 0.001, -0.001; and c , -95.0, -0.7, -1.2, respectively. MT in people born in the 1910s (around 100 years of age) increased exponentially with age after 40 years of age. MT in people born in the

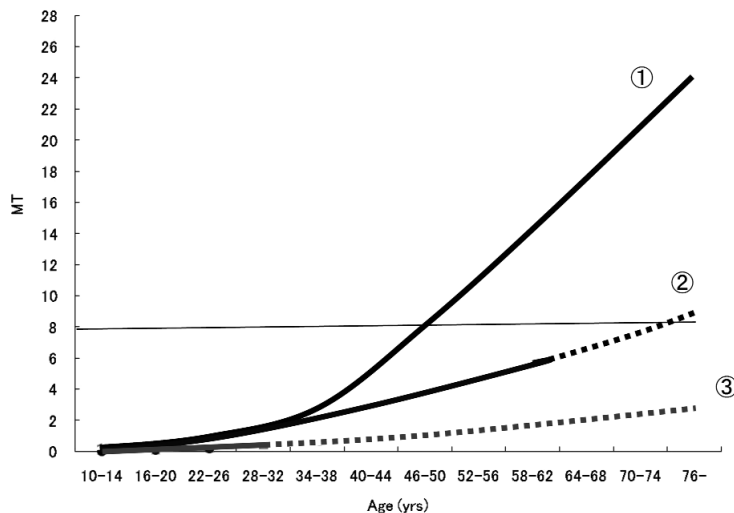


Fig. 3 Change of MT with age as a function of birth year

1950s (around 60 years of age) also increased gradually with age. However, MT in people born in the 1960s (around 50 years of age) did not increase with age like that in people born before the 1950s, and these people had many remaining teeth. The number of MT which estimated at age 80 in all three generations from the multinomial expression estimation curve were 21.8, 9 and 4.1, respectively. It was predicted that the goal of the 8020 Campaign could be achieved when the generation born in the 1960s reaches 80 years of age, approximately 20 years from now. It is predicted that Japanese elderly people will have a large number of remaining teeth in the future.

Figure 4 summarizes the changes in MT and DFT⁷⁾ as a function of birth year with age. DFT tended to increase before 40 years of age and decrease after 40 years of age. However, MT decreased throughout the 50 years of the Japanese National Survey. DFT changed by 6 or 7, while MT showed a difference of about 20. DFT decreased after 40 years of age by increasing MT, but MT did not change dynamic. MT comes to show the final result in the human mouth from birth to old age.

The reason for the observed decrease in MT over the course of 50 years must be considered. Tooth loss is generally thought to be due to both dental caries and periodontal disease. If dental caries and periodontal disease are the main reasons for increasing MT, the prevalence of these diseases should also be expected to decrease. It is clear that dental caries is decreasing, as DMFT at 12 years of age is about 1. Also, it is believed that the periodontal condition of adults in Japan has improved from past decades. However, epidemiological data for factors such as caries are lacking. Because caries and periodontal disease have risk factors similar to those of non-communicable diseases (NCDs), the FDI (Federation of Dental International) has recommended the inclusion of these conditions as NCDs. Further investigations are necessary regarding the association between MT reduction and the prevalence of periodontal disease or socioeconomic factors, including lifestyle, to determine the reason for the decrease in MT.

MT is considered to reflect the oral health status of a population, from birth to the elderly. Therefore, MT in the elderly population in Japan is expected to reveal the success or failure of the

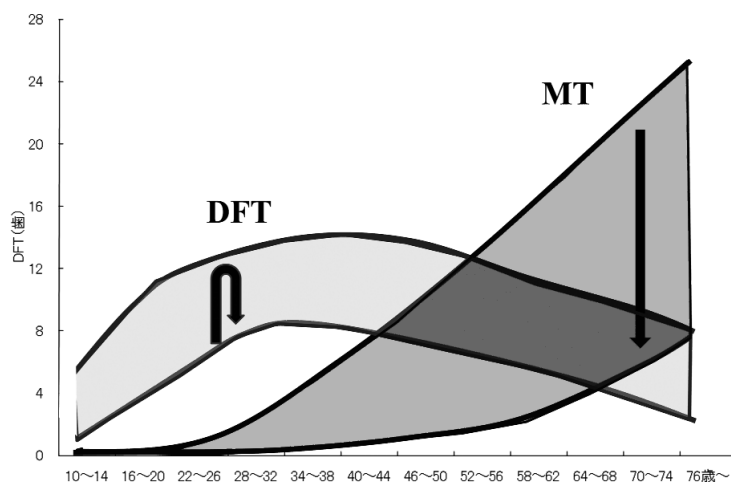


Fig. 4 Change of DFT and MT with age as a function of birth year

Japanese oral health system, which consists of maternal and child healthcare, oral health examinations in 1.6-year-old children, 3-year-old children, and school-age children, oral health examinations in companies, and oral examinations at 40, 50, 60 and 70 years of age, as well as the effectiveness of the Japanese dental insurance system. To determine the outcome of oral healthcare in terms of MT, I think that for example, the MT rate should be calculated.

It is suggested that MT may serve as an important dental index as Japan emerges as a world leader in terms of average lifespan.

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