Recent Changes in Seasonal Variation of Senile Mortality

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Abstract

In the preceding report on the seasonal variation of deaths from cerebrovascular diseases, the writers reported that mortality from cerebral thrombosis and embolism, more frequent than cerebral haemorrhage among the aged, picks up in summer in districts where temperature exceeds 24°C in the hot months. It is further studied in this report whether such a summer upcurve is seen only for this senile ailment or for others as well, such as heart disease, tuberculosis, pneumonia-bronchitis, and malignant neoplasm of stomach.

1. The phenomenon in which mortality declines along with the rise of temperature but turns upward in the summer season is witnessed for all these diseases but malignant neoplasm. Deaths from the last named cause occur differently.

2. The seasonal variations of deaths from cerebral thrombosis and embolism can roughly be classified in form according to regional climatic conditions. It is found, however, that mortality increases in summer for chronic rheumatism in those areas where no pickup is recorded in the hot months for cerebral thrombosis and embolism, and that the summer peak is much higher for tuberculosis than for this cerebral disease. That mortality resumes an upturn in summer is not a phenomenon confined to the senile disorder but one greatly dependent upon socio-economic conditions in some regions of the country.

3. As for pneumonia-bronchitis, this phenomenon appears more conspicuously for infants than for other age groups. On the other hand, the winter peak of mortality is now a little lower for infancy and old people, but it was formerly much higher and then has fallen off to the present level thanks probably to the improvement of room heating facilities in the cold months, indicative of the future possibility of deseasonalization at least for infant mortality.

1. Introduction

The seasonal variation of Japanese mortality has been undergoing a series of significant changes in general pattern by decade, by prefecture and by disease since the turn of the century. Total mortality twice curved up in summer and winter until the
1940's, namely the bimodal pattern with deaths clearly concentrated in the hot months. Thereafter, deaths decreased considerably in summer, along with the gradual reduction of the death rate itself, and the seasonal variation changed to a pattern of concentration in winter in the 1950's. This new pattern became all the more conspicuous in the 1960's not only for total mortality but also for deaths from cerebrovascular diseases and early infants (under 1 year old) mortality.

Sometime in 1967 and 1968, however, noticeable changes came to the fore in the variation pattern, though there were some differences between diseases: the concentration of deaths in the cold months got less marked and the seasonal variation became somewhat moderate on the whole—a new phenomenon indicative of deseasonality in mortality as witnessed in North Europe and the United States.

As for cerebrovascular deaths which have so far accounted for a quarter of total mortality and which have been concentrated in the cold season, the winter peak has begun to get lower and a small hill has appeared in summer as reported in detail by the authors (1973). The summer upcurve of cerebrovascular mortality is ascribed not to cerebral haemorrhage but to cerebral thrombosis-embolism.

It is to be noted in this connection that the gain of deaths from cerebral thrombosis embolism differs widely among the northeastern, central and southern parts of the main islands, and that this senile malady mostly affects the aged older than 60 years. Judging from these facts, the authors consider that the geographical difference in the seasonal variation of mortality from cerebral thrombosis-embolism comes from the acclimatization of old people to the native climate, hot or cold.

In this report, the authors want to consider if the recent increase of senile mortality in summer is a phenomenon peculiar to senile diseases, cerebral thrombosis-embolism in particular, or it is common to all diseases frequently affecting the aged.

2. Methods and data

The seasonal variation of heart disease mortality is first observed, as in the case of cerebral thrombosis-embolism, prefecture by prefecture for 1968-71 in terms of the monthly death index (monthly mortality/annual mortality x 1,200, adjusted duly for differences in the number of days a month).

The same observation is made of tuberculosis, for which the age of the victims has recently changed from youth to old people (see Table 1). It is aimed at how the living organisms, which have probably experienced medically and psychologically the gradual diminution of vital functions along with the advance of the age, will react as mass to the seasonal changes of climate.

Another death cause similarly observed is pneumonia-bronchitis frequently affecting old people. But the period of observation is not 1968-71 but 1966-71, excluding 1970, the year of influenza.

Incidentally, all these diseases show the conspicuous seasonal variation in mortality. As for the first three, i.e. cerebral thrombosis-embolism, heart diseases and tuberculosis, there was a high peak in summer in the 1900's, and deaths have recently (in the 1970's) got concentrated in the cold months.
Another ailment with a peak in the 1900's is malignant neoplasm, which has come to show the least seasonal variation of mortality and which marks a slight increase in autumn for all age groups, as reported by MOMIYAMA (1965). It now is now among the biggest death causes, and malignant neoplasm of stomach in particular is one of the most serious death causes for old people. In this light, the seasonal variation of mortality from this senile malady is finally observed (1968-71).

Mortality data are quoted from the Monthly Reports of Vital Statistics. For climatological observation, reference is made to the Meteorological Sourcebook.

### Table 1. Mortality rate (per 100,000 persons) by disease, by age in 1935 and 1971

<table>
<thead>
<tr>
<th>Cerebrovascular diseases</th>
<th>Heart diseases</th>
<th>Ischaemic heart disease</th>
<th>Hypertensive disease</th>
<th>Tuberculosis</th>
<th>Pneumonia</th>
<th>Bronchitis</th>
<th>Pneumonia</th>
<th>Malignant neoplasms</th>
<th>Malignant neoplasm of stomach</th>
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<tbody>
<tr>
<td>Total</td>
<td>169.6</td>
<td>82.0</td>
<td>36.4</td>
<td>16.7</td>
<td>190.8</td>
<td>13.0</td>
<td>186.7</td>
<td>28.4</td>
<td>22.1</td>
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<tr>
<td>0~4</td>
<td>1.6</td>
<td>5.1</td>
<td>0.0</td>
<td>---</td>
<td>55.1</td>
<td>0.5</td>
<td>850.9</td>
<td>38.1</td>
<td>34.6</td>
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<tr>
<td>5~9</td>
<td>0.5</td>
<td>0.8</td>
<td>0.0</td>
<td>---</td>
<td>46.3</td>
<td>0.1</td>
<td>42.4</td>
<td>2.6</td>
<td>2.2</td>
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<td>10~14</td>
<td>0.5</td>
<td>1.2</td>
<td>0.1</td>
<td>0.0</td>
<td>99.4</td>
<td>0.1</td>
<td>21.3</td>
<td>1.6</td>
<td>1.3</td>
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<tr>
<td>15~19</td>
<td>0.8</td>
<td>2.7</td>
<td>0.2</td>
<td>0.0</td>
<td>378.3</td>
<td>0.4</td>
<td>43.2</td>
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<td>1.8</td>
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<td>20~24</td>
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<td>4.9</td>
<td>0.5</td>
<td>0.2</td>
<td>467.8</td>
<td>0.8</td>
<td>50.6</td>
<td>1.9</td>
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<td>25~29</td>
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<td>1.2</td>
<td>0.4</td>
<td>361.0</td>
<td>2.0</td>
<td>51.1</td>
<td>1.9</td>
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<td>2.5</td>
<td>0.8</td>
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<td>49.9</td>
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<td>2.4</td>
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<td>35~39</td>
<td>18.4</td>
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<td>1.4</td>
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<td>6.9</td>
<td>50.0</td>
<td>3.1</td>
<td>2.9</td>
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<td>40~44</td>
<td>37.6</td>
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<td>9.5</td>
<td>2.2</td>
<td>162.7</td>
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<td>70.9</td>
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<td>220.4</td>
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<td>56.0</td>
<td>13.8</td>
<td>140.2</td>
<td>28.3</td>
<td>152.7</td>
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<td>15.2</td>
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<td>421.4</td>
<td>188.8</td>
<td>105.9</td>
<td>28.1</td>
<td>128.0</td>
<td>39.6</td>
<td>230.5</td>
<td>36.9</td>
<td>29.7</td>
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<tr>
<td>65~69</td>
<td>835.2</td>
<td>342.9</td>
<td>189.9</td>
<td>63.4</td>
<td>114.5</td>
<td>64.8</td>
<td>365.2</td>
<td>88.9</td>
<td>71.9</td>
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<tr>
<td>70~74</td>
<td>1493.9</td>
<td>595.0</td>
<td>308.5</td>
<td>129.1</td>
<td>71.3</td>
<td>91.8</td>
<td>568.0</td>
<td>181.1</td>
<td>140.1</td>
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<tr>
<td>75~79</td>
<td>2601.9</td>
<td>1069.0</td>
<td>493.9</td>
<td>269.9</td>
<td>120.8</td>
<td>369.8</td>
<td>276.2</td>
<td>1042.8</td>
<td>450.2</td>
</tr>
<tr>
<td>80~</td>
<td>4282.2</td>
<td>2425.8</td>
<td>844.5</td>
<td>635.4</td>
<td>33.9</td>
<td>121.0</td>
<td>806.3</td>
<td>973.6</td>
<td>688.8</td>
</tr>
</tbody>
</table>

* Based on “Kosei-no Shihyo” Table 17 on Vol. 19, No. 15

Another ailment with a peak in the 1900's is malignant neoplasm, which has come to show the least seasonal variation of mortality and which marks a slight increase in autumn for all age groups, as reported by MOMIYAMA (1965). It now is now among the biggest death causes, and malignant neoplasm of stomach in particular is one of the most serious death causes for old people. In this light, the seasonal variation of mortality from this senile malady is finally observed (1968-71).

Mortality data are quoted from the Monthly Reports of Vital Statistics. For climatological observation, reference is made to the Meteorological Sourcebook.

### 3. Results and Considerations

#### 3.1 Heart Diseases

Heart diseases mortality (ICD No. 393–398, 410–414 and 420–429) curve up sharply in winter in all prefectures except Hokkaido, and the seasonal variation pattern is closely similar to that of cerebrovascular diseases. The death rate declines along with the rise of temperature, but it remains level or turns upward, though very slightly, in the summer
season. This phenomenon is seen in some prefectures along the Pacific coast, if not so clearly as in the case of cerebrovascular diseases (see Fig. 1a).

Further classified, ischaemic heart disease (ICD No. 410-414) shows a small hill in July in such central mountainous prefectures as Gunma, Nagano and Gifu, and in some inland areas like Kyoto and Nara. The monthly death index slightly rises up in July and August, respectively, in Toyama and Niigata, but it marks no gain whatsoever in all the northern prefectures. In the southern district, on the other hand, the concentration of mortality in winter is quite conspicuous, as in the case of cerebral thrombosis-embolism, though deaths climb up to a peak in July and August, respectively, in Kochi and Tokushima (Fig. 1b). Ischaemic heart disease accounts for about one half of total mortality from heart diseases, and its seasonal variation can be said to represent roughly the prefecture-by-prefecture trends for all heart diseases.

Deaths from chronic rheumatic heart disease (ICD No. 393-398) are so infrequent that the seasonal variation of the monthly death index proves to be extremely irregular. If total mortality from this disease is considered as a whole, it shows a high peak in winter and a small hill in July, and the summer hill appears much more conspicuous than that for ischaemic heart disease.
As shown in Fig. 1c, mortality from chronic rheumatic heart disease (the black line curve), quite different from the case of cerebral thrombosis-embolism and ischaemic heart disease curves up, thoughly slightly, in summer as well as in winter even in northern prefectures, such as Yamagata and Iwate. In Yamanashi, Shiga and Hiroshima, the peak in summer rises as high as that in winter. In Kochi in particular, the summer peak is much higher than its winter counterpart. In Tokyo and Osaka, on the other hand, the summer peak is not so high and, moreover, the winter summit is not so high as in other prefectures. Thus, the seasonal variation is as moderate as in Hokkaido (the coefficient of variation $-\sigma/m-$ at 0.155 in Tokyo, 0.141 in Osaka and 0.157 in Hokkaido as compared with 0.292 in Iwate and 0.310 in Kochi). A similar pattern of moderation is seen also in Chiba and Kanagawa close to Tokyo the most urbanized area of the country.

It is to be noted that the winter upcurve in the urbanized areas like Tokyo and Osaka is not so conspicuous as in rural prefectures, whereas the seasonal variation of mortality from chronic rheumatic heart disease is considerably great in non-urbanized regions, indicating of a wide difference in the living conditions. Another noteworthy phenomenon is that the coefficient of variation is surprisingly small in Ehime (0.190) and Nagasaki (0.136), and that the winter peak is considerably low there. This is perhaps to be ascribed for the most part to the inland sea and oceanic warm and comfortable climate,
Other forms of heart disease (ICD No. 420-429) also show a variation pattern, not much different compared with heart diseases as a whole, as shown in Fig. 1c (the dotted line curve). It is noticeable, however, that deaths from this disease mark an upcurve in summer, though very slightly, more clearly than in the case of ischaemic heart disease, and that in Ishikawa the summer peak is much higher than that for ischaemic and chronic rheumatic heart diseases.

When it was first found in 1973 that cerebral thrombosis-embolism showed an apparent summer hill in the central part of the main islands, the authors assumed that this phenomenon might be regarded as indicating the degree of old people's acclimatization to scorching heat plus humidity in summer i.e. the limited scope of ecological conditions. The foregoing paragraphs roughly summarize the geographical (prefectural) distribution of the seasonal variation patterns by heart diseases. Due to the lack of classified vital statistics, it is extremely difficult to observe the trends age by age. As shown in
Table 1, however, the distribution by age of deaths is visible for heart diseases as a whole and ischaemic heart disease alone.

As the present report is aimed mainly at grasping the trends of senile mortality, the seasonal variation of hypertensive heart disease mortality (ICD No. 402, 400.1, 400.9 and 404) is taken up as a specific subject. This is because hypertensive heart disease usually gets frequent among old people as the age advances, judging from the age-by-age distribution of deaths from hypertensive diseases (No. 401-404).

Though the monthly variation is quite irregular due to lack of data, mortality from hypertensive heart disease considerably curves up in the cold months in all the prefectures except Hokkaido (see Fig. 1d), analogous to other heart diseases already mentioned Figs. 1a, 1b and 1c). It can be seen that the summer upcurve in July or August in the central prefectures is not so conspicuous as in the case of cerebral thrombosis-embolism, and that it is more clearly visible than in the case of ischaemic heart disease in such Pacific coast prefectures as Tokyo, Kanagawa, Aichi, and especially Osaka. Incidentally, hypertensive heart disease accounts for the majority of total mortality from hypertensive diseases, and its seasonal variation is quite similar to that of other hypertensive diseases.
Its patterns cannot be classified regionally so clearly as in the case of cerebral thrombosis-embolism, but mortality curves up, though slightly, in summer as well as in winter also for ischaemic and chronic rheumatic heart diseases.

As for chronic rheumatic heart disease, the seasonal variation is exceptionally small on the whole in Hokkaido, while various geographical differences are seen in general variation pattern in all other prefectures. The upcurve in summer is considerably small in Tokyo and Osaka but very great in the northern prefectures, such as Yamagata and Iwate—a phenomenon not seen for cerebral thrombosis-embolism. In Kochi, a southern coastal prefecture, a pattern never seen for cerebral thrombosis-embolism appears with a prominent peak in summer. What are the reasons responsible for such geographical differences? We believe they can be accounted for first of all by the accessibility or inaccessibility to medical service.

A rough idea of the age-by-age distribution of seasonal variation patterns by disease can be obtained from Figs. 2a and 2b (cerebrovascular diseases, heart diseases and tuberculosis; ischaemic heart disease, hypertensive heart disease and hypertensive diseases, respectively), but such age classification is highly difficult prefecture by prefecture. Our previous report shows the summer upcurve of mortality from cerebral thrombosis-embolism from prefecture to prefecture, and the present report clarifies the more or less similar climb in summer of deaths from heart diseases. Figs. 2a and 2b indicate the different seasonal variation patterns for senile diseases from age to age. It is seen that tuberculosis shows a conspicuous summer upcurve for the age bracket of 75–79 years old, but that such a summer upcurve is not clearly seen for other diseases. After all, the seasonal variation of mortality age by age cannot be seen definitely and exactly. To say the least of it, however, it is noteworthy that the monthly death index (for tuberculosis, heart diseases, hypertensive heart disease and ischaemic heart disease) in July or August is appreciably greater for the age bracket of 74–79 years old than in the months following July and August.

**Fig. 2a.** Cerebrovascular diseases, heart diseases and tuberculosis: Seasonal variation by age (1968–1971).
* Death rate per 100,000 persons in 1971.
** Coefficient of variation in 1968–1971.
or preceding the peak month, for that age falls upon the age limit firmly established as part of the Japanese lifelong employment system.

3.2 Tuberculosis

Tuberculosis mortality is frequent, though less than in the cold season, in summer as well as in winter as shown in Fig. 3. The death rate is very high for old people (see Table 1), and the summer upcurve of mortality is higher for the aged over 70 (see Fig. 2a). It might well be assumed that these facts account for the summer upcurve seen in many prefectures (see Fig. 3), a salient feature common to all the senile diseases including cerebral thrombosis-embolism.

It is especially noticeable that mortality usually turns out to be higher in summer for tuberculosis than for cerebral thrombosis-embolism. Whereas the monthly index for the latter disease is below 100 in many prefectures, that for tuberculosis exceeds the 100 mark in more prefectures (Gunma, Saitama, Kanagawa, Toyama, Yamanashi, Miye, Shimane, Okayama, Hiroshima, Kochi, Oita, and Miyazaki). In Toyama in particular, the death index stands as high as 143 in July, to be compared with 126 in January, and this agrees with the general tendency that the death rate usually declines from winter to spring and sharply curves up in the hot months. It is notable that even in urbanized areas, such as Tokyo, Aichi, Kyoto and Osaka, the death rate comes near to closely the 100 mark in summer. Among the seven big cities, Yokohama shows the highest summer hill of 106 in July.

These facts indicate the limit of ecological conditions for tuberculosis patients for whom living conditions have been getting worse for a long period. All this is the final outcome of ever-worsening socio-economic conditions left unimproved for tuberculosis patients in the past years of economic growth and national prosperity; in backward rural
regions no adequate measures have not been implemented for diet improvement, better housing and efficient medical service, and in urbanized areas citizens, the working masses in particular, have been exposed to all sorts of pollution plus overcrowding without proper counter-measures.

3.3 Pneumonia-bronchitis

As may be noted in Table 1, pneumonia-bronchitis (ICD No. 480–486, 490–491 and 466) in 1935 affected more children than the aged, but in recent years (1975) it is more frequent among old people than in the younger generation. The seasonal variation of mortality from this disease, as shown in Fig. 4, can be said to indicate the general pattern which old people would show prefecture by prefecture. The bimodal pattern of a very high peak in winter and a low hill in summer is seen in most prefectures, and the summer hill gets gradually higher in urbanized prefectures, such as Tokyo, Aichi, Osaka, and Hyogo.

As for pneumonia-bronchitis, mortality is high among old people as in the case of cerebral thrombosis-embolism, but early infancy (less than 1 year old) cannot be disregarded entirely. With early infant mortality excluded for the sake of convenience, therefore, the seasonal variation pattern (1968–72 excluding 1970) is drawn in Fig. 5a,
based upon total mortality data. It is clearly seen that the seasonal variation pattern minus early infancy does not show any marked difference from that for total mortality, and that the summer upcurve of mortality is somewhat clearer for early infants alone than that for total mortality.

Since as is evident in Table 1, early infancy accounts for a very small percentage, the prefecture-by-prefecture seasonal variation pattern can be regarded as roughly indicating the seasonal reaction of old people as in the case of cerebral thrombosis-embolism. As may be noted in Fig. 5b, the death rate is low for the young and able-bodied people but the seasonal variation of their mortality is rather great with the winter peak higher than for early infants and old people. It is worth mentioning that, whereas the death rate in winter has so far been deplorably high for early infants and old people, the winter maximum is not so high now as in the past and not so high as for the other age groups (production age of 16–60 years). In other words, early infants and old people

Fig. 4. Pneumonia-bronchitis: Geographical distribution of death rate and variation pattern (1966–1971 excepting 1970).
* Mortality from pneumonia-bronchitis in Japan (male & female) in 1971.
The adjusted death rates are based on the population structure in 1960 (“Kosei no shihyo” Vol. 20, No. 11, p. 44).
have come to be protected somehow or other by artificial climate in the cold and hot months, while able-bodied people have to work under seasonally changing conditions and endure scorching heat and severe cold, and the seasonal variation of mortality comes to differ visibly between the able-bodied and the others (early infancy and old people).

4. Malignant neoplasm

The diseases analyzed in the foregoing all show clearly the seasonal variation of mortality. Let us have a look at malignant neoplasm which has so far been regarded
as less seasonal in morbidity and mortality. Does mortality from malignant neoplasm of stomach (ICD No. 151) increase in the hot season? The seasonal variation of malignant neoplasm of the stomach is shown prefecture by prefecture in Fig. 6a. In Hyogo and Osaka, the mortality curve tends to curve up very slightly in summer, but in most prefectures the general pattern shows neither a summit nor a valley from spring through winter—more or less deseasonality. No local difference is seen either. Fig. 6a, however, indicates on the whole that the seasonal variation generally increases somewhat in the latter than the former half. As shown in Fig. 6b, classified by age group, there is almost no difference in the seasonal variation. The monthly death index is somewhat larger in the latter than the former half.

As for malignant neoplasm (ICD No. 140-209), the monthly death index rises up to the summit of 120 in August, to be compared with 81 in March, for the age bracket of 5-9 years (leukemia in 1971 accounts for 63 of total mortality from this disease). In other age groups, nearly no seasonal variation is witnessed. In the case of malignant neoplasm of stomach, various age groups mark a nearly similar seasonal variation: the 50's and the 60's indicate the least seasonal variation; the 70's and other age groups show an upcurve in autumn. For malignant neoplasm of stomach and malignant neo-
plasm as a whole, it can be roughly concluded that the seasonal variation is very slight on the whole though the monthly index tends to curve up somewhat in autumn, and that no local peculiarity is seen either.

5. Seasonal variation of mortality in the future?

It is well known that most diseases now occur in the cold months with deaths concentrated in this part of the year. Decades ago, cerebrovascular and heart diseases were frequent in summer as well as in winter, and more recently the summer upcurve of mortality got gradually lower while the winter summit remained as relatively prominent as ever with the gradual reduction of the death rate itself. As for tuberculosis, too, the seasonal variation of mortality has changed from the pattern of concentration in summer to that of concentration in the cold season. Pneumonia-bronchitis years ago showed a several-month-long plateau from winter through spring, and later the lowering of mortality in spring has come to set off the peak in winter more prominently than it really is.

A careful survey of these changes disease by disease clearly reveals, that deaths from some diseases are not so seldom in summer, though less than in winter, particularly in those areas where it is hot and humid in summer. In the case of malignant neoplasm, however, mortality lacks in seasonality and locality on the whole.

According to MOMIYAMA (1965), however, deaths from neoplasm once climbed up to
a peak in the hot months, and later the peak month gradually moved from summer to autumn. The question naturally suggests itself: Will the peak month move from fall to winter in the future? Will mortality curve up in summer as well as in winter as seen in some senile diseases, and, if so when, particularly in the areas where it is usually hot and humid in the hot months?

As shown in Fig. 7, since the start of the 1970's the winter peak of mortality from cerebrovascular diseases has begun to get lower than in the 1960's, indicating the gradual moderation of seasonal variation. According to TAKEUCHI and MOIYAMA (1973), the sharp lowering of the winter peak for pneumonia-bronchitis led to the apparent moderation of seasonal variation in pneumonia-bronchitis mortality in the 1970's. Another study by MOMIYAMA and TAKEUCHI (1975) reveals that early infant mortality from pneumonia-bronchitis has come to show an upcurve in summer, more markedly in the urbanized areas than in the less urbanized regions. What does the recurrence of such a summer upcurve mean from the standpoint of medical science and public health? MOMIYAMA et al. state as follows:

"The summer upcurve of pneumonia-bronchitis infant mortality, together with the lowering of the death rate itself in the past years, may be regarded as indicating that the real mortality which has so far been shrouded in the dark clouds of death concentration in the winter season has finally been brought to light. The formation of the recent bimodal seasonal variation is indicative of what remains still unclarified and unar-

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**Fig. 7.** Cerebrovascular diseases: Historical changes in seasonal variation (1899–1973).
1) Crude death rate.
2) Adjusted death rate based on the population structure in 1935.
3) Coefficient of variation.
rested in spite of all the human efforts against diseases (for instance, congenital infantile weakness). In the case of pneumonia-bronchitis, victims are for the most old people as well as infancy, i.e. the feeblebodied who are liable to suffer from cold and heat more bitterly than the other age groups. The degree of their real sufferings is well reflected in the recent seasonal variation pattern of mortality, isn’t it? This is the true picture of human morbidity and mortality invariably arising from the environmental realities, natural and social, and this despite the marked progress of science and technology, medicine in particular.”

Not only for pneumonia-bronchitis but also for gastro-enteritis and tuberculosis, the death rate itself has recently got appreciably lower, and the summer upcurve rather prominent, relatively.

In their geographical and chronological studies on the seasonal variation of mortality, the authors have often emphasized the importance of room heating in winter for early infancy. They have found among other things, that deaths from cerebral thrombosis-embolism increase visibly in the hot and humid areas where the monthly mean temperature exceeds 24°C in summer. Because old people will increase relatively in the total population, they urge that adequate measures be taken not so much for cooling as for dehumidification in the hot months.

Thanks to the remarkable economic growth, an increasing number of dwellers especially city dwellers have come to enjoy comfortable artificial climate (cooled living rooms, buildings, restaurants, hotels, cars, etc.) throughout the hot season as well as better diet and other improved living conditions all the year round. For most Japanese, however, living conditions are far from being satisfactory. Still worse, not only infants, children and old people but also unhealthy and morbid or handicapped people are often obliged to live, learn and work under unsatisfactorily controlled climatic conditions. But it is highly problematical from the long-term point of view whether or not it is really as recommendable for able-bodied people as for early infants and old people, to live for long under perfectly conditioned climatic environment.

Our macro-climatological studies reveal that it is essential to secure by all means climatic conditions suitable for sound subsistence and healthy living in the interest of early infants, children, the aged and the feeble-bodied (though still young) people. Whether or not variation in mortality can rise above natural seasonal changes is dependent not only upon the progress of medical science and technology but also upon the social progress and economic growth, the satisfactory supply of oil and other fuels in particular. After all is said and done, things must be studied properly and counter-measures be implemented adequately and consistently from the long-term standpoint and from the higher angle of humanity.

References


最近の成人病死亡にみられる季節パターンの特性

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筆者らは，先の脳血管疾患の原因疾患別の季節変動形態の研究において，脳出血に比べて高齢者に多い疾患である脳硬塞に，夏季が約 24℃ を越す地域に死亡の夏山があることを見出した。本報ではその死亡の夏山が，脳硬塞に特有の現象か，他の疾患死亡にもあらう現象かを，心疾患，結核，肺炎・気管支炎および胃の良性新生物につき検討し，得られた結果の地域性につき若干の考察を加えた。

1. 気温の上昇に伴って低下した死亡率が夏季に再び増加する現象は，胃の良性新生物を除き，いずれの疾患にも見られた。良性新生物の死亡形態は他の疾病死亡と異なるものと思われた。

2. 脳硬塞死亡の季節変動形態は，よそ地域の気候的特性と関連づけて地域区分できたが，慢性リウマチ性疾患が脳硬塞死亡では夏山のない地域においても夏季に死亡増加を顕著。また結核死亡の夏山は脳硬塞死亡の夏山より顕著である。これらのことから，夏に死亡が再び増加する現象は，単に高齢者の死亡の 1 つの特徴であるのみならず，ある地域の社会経済的背景の 1 つのあらわれであるとも解釈した。

3. 肺炎・気管支炎の死亡の夏山は，乳児において他の年齢層より明確である。また該疾患では乳児と高齢者の方が，その中間の年齢群におけるより死亡の冬山がやや低い。肺炎・気管支炎の乳児の死亡の冬山は以前は著しく高かったものであり，その山の低下後の最近の低い夏山の出現は，冬季の暖房様式の改善の効果とそれによる死亡の年間変動の脱季節化を示唆するものであろう。