LONG WORKING HOURS AND OCCUPATIONAL
STRESS-RELATED CARDIOVASCULAR
ATTACKS AMONG MIDDLE-AGED
WORKERS IN JAPAN

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Two hundred and three Karoshi victims who suffered cardiovascular attacks and for whom workers' compensations was claimed were surveyed. These cases were 196 males and 7 females in middle age, and comprised 123 strokes, 50 acute cardiac failures, 27 myocardial infarctions and 4 aortic ruptures. As a sociomedical background, it was shown that two-thirds of them were working for long hours such as more than 60 hr per week, more than 50 hr overtime per month, or more than half of their fixed holidays before the attack. Moreover, among the white-collar workers, these long working hours were accompanied with other stressful work issues such as career problems, excessive business trips, strident norms, and changes of work places; among the blue-collar workers, they were accompanied with those such as irregular midnight work, insufficient manpower and long-distance driving, etc. On the other hand, eighty-eight cases of them experienced several minor and sudden events including work-related emotional anxiety or excitement, rapid increase of workload, unexpected work trouble or environmental changes of work places anticipated at least within 24 hr directly before the attack. It was concluded that Karoshi, meaning fatal attacks by overload, was one of the work-related diseases mainly triggered by long working hours.

The problem of Karoshi due to occupational stress-related cardiovascular attacks among middle-aged workers has recently come to be known in Japan. Uehata (1989) described Karoshi as a socio-medical term that refers to fatal incidence and associated work disability due to cardiovascular attacks such as strokes, myocardial infarction or acute cardiac failure which could occur on the basis of aggravating hypertensive or arteriosclerotic diseases, triggered by heavy workload.
As a background to this increase in the number of Karoshi cases, the working conditions in the current Japanese economy, particularly long working hours, need to be mentioned, and many claims to workers' compensation have been demanded by families of victims who died of cardiovascular attacks in their most productive years.

This paper will report on Karoshi cases in which we were consulted regarding workers' compensation claims in the past sixteen years.

METHODS

Most of the Karoshi consultation cases were brought forward by the victim's families or colleagues supported by lawyers. In these consultations, their concrete work stress, life habits and past histories of health were precisely interviewed, and these responses were confirmed by their company's working records and medical examination data.

The interview items, comprised many kinds of work stress, in which working hours per week, holidays, overtime work per month and physical and emotional stress before the attack were included; and life habits such as smoking, alcohol consumption and sleeping hours and their past medical records including hypertension, diabetes mellitus, heart disease, and other attacks-related disease histories were also surveyed.

For the sixteen years from 1974 to 1990, two hundred and three Karoshi consultation cases were collected, in which fifty six cases were officially compensated as occupational disease, and others were mostly in progress of claims. Sociomedical study on the background of these cardiovascular attacks retrospectively was attempted.

RESULTS

Sex, age, kinds of diseases and the periods until attack

The cases consulted comprised 196 males and 7 females. The ages were distributed from 21 to 67, and in each age group of 45–54, 35–44, more than 55, and less than 34, there were 81, 64, 36, and 22, respectively.

Of the kinds of diseases, two-thirds of them were strokes that included subarachnoidal bleeding (57 cases), cerebral bleeding (46 cases), cerebral infarction (13 cases) and unknown type of stroke (7 cases). Others were 77 heart attacks such as myocardial infarctions (27 cases) and acute cardiac failure (50 cases) and 4 aortic ruptures.

Of the periods from attack to death in 174 cases who died, sudden death within 24 hr including detection after death were 135 (77.6%), death in 7 days were 26 (14.9%), and more than 8 days were 13 (7.5%). Autopsy was performed in only 16 cases.
Life habits and past histories of diseases related to attacks

Risk factors of cardiovascular diseases such as smoking, high consumption of alcohol and chronic noncommunicable disease including hypertension and diabetes mellitus were surveyed. The prevalence of smoking, except for females, was 64.1% in victims, and this was not much more than that of general Japanese male adolescents. Similarly, high daily alcohol consumption, more than 2 bottles of beer, was found in only 30 persons, though 73.8% of them were drinking.

On the other hand, attack-related diseases such as hypertension, diabetes mellitus and other atherosclerotic diseases were not found in ninety persons (44.3%). Especially, these tendencies of the prevalences were characteristic in the cases of subarachnoidal bleeding and acute cardiac failure. Among the sixty-five cases of hypertension, thirty-nine (60.0%) were controlled with drug; eleven of sixteen cases with heart disease, and five of eight with diabetes mellitus were also controlled by physicians.

Vital exhaustion complaints known by families or colleagues before attack

In the 203 cases, 111 (54.7%) announced various vital exhaustion complaints to their families or colleagues before the attack, which were mostly unusual fatigue (73 cases), sleeplessness (16 cases), bad physical conditions (14 cases) and feeling of common cold (12 cases). Especially, the complaint of unusual fatigue was more prevalent than that of proper symptoms in each disease such as severe headache in subarachnoidal bleeding (18 in 63 cases) or chest pain in myocardial infarction (7 in 33 cases).

Working conditions before the attack

The information concerning the working conditions that triggered the attack were surveyed by interviewing those connected with the victims such as family members, colleagues, subordinates, union officials and supervisors, and the victims’ past working records.

1) Kinds of jobs. The kinds of jobs of the victims mainly consisted of 39 salesmen, 31 factory operators, 28 engineers, 25 drivers, followed by journalists or editors, construction workers, teachers, public servants and clerical workers. The characteristics of these kinds of jobs were that the numbers of white-collar workers was slightly more than that of blue-collar workers; most salesmen had supervising titles such as chief or director; about half of factory operators were engaged in night and shift work, and among the drivers, 15 were taxi drivers.

2) Suggesting factors leading to the attacks. Factors at work leading to the attacks as mentioned by the victims’ concerned are shown in Table 1. About two-thirds of these factors consisted of the complex working time issues including long hours of work (more than 60 hr per week), excessive overtime (more than 50 hr per month) and holiday work (more than half of their fixed holidays). Moreover, it was suggested that these long working hours were accompanied with other
Table 1. Suspected work-related factors influencing cardiovascular attacks of Karoshi victims.

<table>
<thead>
<tr>
<th>Number of cases</th>
<th>White-collar workers</th>
<th>Blue-collar workers</th>
<th>Total 203</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>%</td>
<td>Cases</td>
</tr>
<tr>
<td>Long work hours including excessive overtime and holidayless work</td>
<td>75 70.1</td>
<td>56 58.3</td>
<td>131 64.5</td>
</tr>
<tr>
<td>Excessive midnight work</td>
<td>19 17.8</td>
<td>43 44.8</td>
<td>62 30.5</td>
</tr>
<tr>
<td>Career development</td>
<td>26 24.3</td>
<td>2 2.1</td>
<td>28 13.8</td>
</tr>
<tr>
<td>Change of employment or work place</td>
<td>27 25.2</td>
<td>26 27.1</td>
<td>53 26.1</td>
</tr>
<tr>
<td>Assignment to a new work place without families</td>
<td>10 9.3</td>
<td>3 3.1</td>
<td>13 6.4</td>
</tr>
<tr>
<td>Excessive business trips</td>
<td>38 35.5</td>
<td>18 18.8</td>
<td>56 27.6</td>
</tr>
<tr>
<td>Heavy responsibilities of work</td>
<td>40 37.4</td>
<td>7 7.3</td>
<td>47 23.2</td>
</tr>
<tr>
<td>Insufficient manpower support</td>
<td>28 26.2</td>
<td>37 38.5</td>
<td>65 32.0</td>
</tr>
<tr>
<td>Urgencies to comply with work norms</td>
<td>34 31.8</td>
<td>16 16.7</td>
<td>50 24.6</td>
</tr>
<tr>
<td>Job troubles</td>
<td>34 31.8</td>
<td>11 11.5</td>
<td>45 22.2</td>
</tr>
<tr>
<td>Long distance car driving</td>
<td>9 8.4</td>
<td>22 22.9</td>
<td>31 15.3</td>
</tr>
<tr>
<td>Excessive receptions for consumers</td>
<td>17 15.9</td>
<td>0 0.0</td>
<td>17 8.4</td>
</tr>
<tr>
<td>Long commuting hours</td>
<td>6 5.6</td>
<td>5 5.2</td>
<td>11 5.4</td>
</tr>
<tr>
<td>Minor troubles or events within 24 hr before the attack</td>
<td>46 43.0</td>
<td>40 41.7</td>
<td>86 42.4</td>
</tr>
</tbody>
</table>

Fig. 1. Work-related triggers within 24 hr directly before the attack in Karoshi cases. Note: Numbers are cases.
Long working hours
Night and shift work
Car driving work
Emotional stress
Career development
Change of employment
Change of work place
Heavy norms
Excessive business trips
Excessive receptions for consumers
Others
Heavy physical work

Smoking
Alcohol abuse
Loss of physical activities
Imbalance of dietary habits
Sleeplessness
Fewer chances for medical examination
Type A behavior pattern

Cumulation of fatigue
Hypertension
Diabetes mellitus
Hyperlipidemia
Atherosclerosis
Arrhythmia

Rapid increase of workload
Minor troubles or events
Anxiety
Strain
Anger
Irritability
Vital exhaustion

Fatty liver
Obesity

Cerebral bleeding
Subarachnoidal bleeding
Aortic aneurysm
Myocardial infarction
Angina pectoris
Cerebral infarction
Acute cardiac failure
Pokkuri disease

Fig. 2. A concept on progress of Karoshi as work-related.
some stressful issues. Especially, among the white-collar workers, the problems of career development, excessive business trips, strident norms, job troubles, and changes of work places that involved being separated from the families seemed to have influenced their health conditions, and among the blue-collar workers, midnight work, insufficient manpower, changes of work places, and long distance driving seemed to have likewise influenced their health before the attack.

On the other hand, Fig. 1 shows the suspected triggers of 88 cases directly before the attack. In these cases, followed by the above-mentioned unhealthy work conditions, several minor and sudden issues including emotional anxiety, increase of workload, unexpected trouble, long-distance trip, heavy physical load, exposure to cold climate and excitement in meeting, all of them related with their work, were anticipated at least within 24 hr.

DISCUSSION

Of the relationships between occupational stress and ischemic heart diseases, COOPER and MARSHAL (1976) suggested in his review that various types of stress sources at work such as quantitative and qualitative overload, role ambiguity or conflict, over- and under-promotion, and impact of poor relationships with reference to these stress sources were associated with heart diseases. On the other hand, KARASEK et al. (1981) suggested that psychological work demand and lower decision latitude on the job may be associated with the development of coronary heart disease, and these work characteristics might be related with the incidence of myocardial infarction as a single risk factor. Moreover, JENKINS (1971) suggested that people having type A behavioral patterns (1959)—known as a risk factor of ischemic heart disease and characterized by extremes of competitiveness, striving for achievement, and aggressiveness—could often be so deeply involved and committed to their work that other aspects of their lives were relatively neglected. UEHATA (1990, 1991) reported that these work characteristics and behavior pattern were also found in Karoshi cases among Japanese middle-aged workers, not only of ischemic heart attacks, but of strokes or acute heart failures. In addition to this, it was thought that in Karoshi cases among Japanese middle-aged workers, these characteristics were accelerated by long working hours. A concept of how long working hour and other work stress are related with cardiovascular attacks is shown in Fig. 2: various kinds of work-related stressors brought about unhealthy change in their habits such as smoking, alcohol abuse, lack of physical activities, sleeplessness and imbalance of dietary or behavior patterns; at the same time fatigue accumulates and worsens their hypertensive or arteriosclerotic physical conditions; the cumulative effects finally resulted in acute cardiovascular seizures triggered by minor work-related troubles or events directly before the attack.

The WHO committee report (1985) on work-related disease, showing the same kinds of concerns, emphasizes that short-term periods of stress bring on temporary
bouts of high blood pressure, and when the such stressful conditions become chronic, it may lead to continuous hypertension. Although there were not so many studies on the relationship between Japanese working styles and cardiovascular attacks among the middle-aged, our Karoshi case study seems to show the probabilities that long hour working complexed with other work stressors promote the attacks. It is expected that if these riskful and triggering factors of the attacks diminish in future, not only the workers’ compensation claims for cardiovascular attacks but the attacks themselves can be decreased and prevented in firms and factories. For these purposes, more surveys must be done experimentally and epidemiologically for prevention of Karoshi.

CONCLUSION

Two hundred and three cases of cardiovascular attack among middle-aged workers for whom workers’ compensation was claimed were examined by case study. As the results, it was shown that these cases mostly consisted of males workers working for long hours complexed with other stressful overload, and that these working styles aggravated their own life habits, and resulted in the attacks triggered by minor work-related troubles or events.

REFERENCES