Analysis of Acute Benzodiazepine Poisoning Cases in Critical Care Departments and Police Agencies in Japan during 1996

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Masahiro Murata 1  and Akira Kurokawa 4

ABSTRACT A retrospective survey of 669 cases of acute benzodiazepine poisoning admitted between January and December 1996 to 59 critical care departments was carried out. A review and retrospective analysis of the records of 95 deceased persons who had ingested benzodiazepines in 27 police prefectural jurisdictions in Japan during the same period, was performed to compare these cases and postmortem medicolegal cases of acute benzodiazepine poisoning. The majority of cases in both groups were deliberate self-poisoning (82.7% and 83.2%, respectively). Efforts to decrease morbidity and mortality from acute drug poisoning should target drugs taken frequently in serious and lethal overdoses. This study confirmed that flunitrazepam, triazolam, etizolam, and nitrazepam were the main agents ingested in cases of acute benzodiazepine poisoning in both the critical care and postmortem groups. More specifically flunitrazepam was the derivative most commonly used in the postmortem group. The statistically significant difference was thought to be attributable to the characteristics of the pharmacokinetic parameters of flunitrazepam, which has a short time to peak interval and a relatively long elimination half-life. In other words, rapid onset and prolonged coma contribute to successful suicide. The majority of patients in the critical care group (82.8%) and in the postmortem group (76.8%) had not undergone plasma or urinary drug screening tests. The lack of drug identification may result in serious diagnostic errors or wrong estimates of severity as well as interfere with scientific progress in the study of acute drug poisoning. Six deaths (0.9% of total) were recorded in the critical care departments as a result of poisoning following ingestion of benzodiazepines in combination with other drugs. Five of them were cases of cardiopulmonary arrest on arrival at the hospital. Therefore, most deaths related to benzodiazepines have occurred outside the hospital as a result of prolonged comatose periods in persons who were not discovered. The fact that acute benzodiazepine poisoning is a kind of the iatrogenic disease in Japan should be taken into consideration, since in most of the cases of poisoning the benzodiazepines were prescribed by a physician and given to the patient by a pharmacist. We regard careless prescriptions and routine dispensation of benzodiazepines as being among the reasons why the number of cases of acute poisoning fails to decrease. Accordingly, to prevent acute benzodiazepine poisoning, it is important to control the clinical use of benzodiazepines (especially flunitrazepam, triazolam, etizolam, nitrazepam) more appropriately by monitoring medication use and carefully counseling patients.

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Key Words: critical care, poisoning, benzodiazepines, suicide

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INTRODUCTION

Benzodiazepines are among the most frequently prescribed categories of drugs in Japan because of their efficacy and safety. However, high overdoses of benzodiazepines occasionally induce cardiovascular and pulmonary toxicity, and the severity of central nervous system depression is influenced by the dose, age of the patient and combined ingestion of other central nervous system depressants. Several fatalities from benzodiazepine overdoses have been reported, with death resulting mainly from mixed overdoses and very rarely from the benzodiazepine overdoses alone. Moreover, there was a case report describing a patient who experienced life-threatening toxicity with coma and vital sign depression following ingestion of only ten times the usual therapeutic dose of triazolam alone.

Acute benzodiazepine poisoning is a common problem confronting every critical care department in Japan, and as in many other countries, benzodiazepine poisoning is the most common form of drug poisoning. Although there are many cases of acute benzodiazepine poisoning in Japan, there are few references in the literature concerning the incidence or the pattern of acute benzodiazepine poisoning in the country.

This study details the magnitude of the problem of acute benzodiazepine poisoning in Japan based on an analysis of 46 police agency reports and acute medical admissions to 59 critical care departments (45% of all critical care departments) during 1996.

METHODS

A retrospective survey of 669 cases of acute benzodiazepine poisoning was carried out. All patients admitted to 59 critical care departments with acute drug poisoning following ingestion of benzodiazepines between January and December 1996 were included in this study. The patients were identified by reviewing the admission and hospital records of each of the 59 critical care departments. A standard data form was used for all admissions to collect patient data, including demographic data (age, gender), data on the drugs and doses ingested, data on co-ingested substances, and details of the management and complications of the drug poisoning. The diagnosis of whether the poisoning was accidental or deliberate self-poisoning was mainly based on the anamnesis and clinical observations. Additional data (including the time spent in the critical care department, serial plasma drug concentrations, and final diagnosis) were collected at the time of discharge. The hospital records of these patients were then reviewed by the physicians and clinical pharmacists at the institutions. Cases of allergic reactions to drugs were excluded.

A review and retrospective analysis of 95 postmortem medicolegal cases of benzodiazepine poisoning recorded in 27 police prefectural jurisdictions of Japan during 1996 were also performed. There were no postmortem medicolegal records of benzodiazepine poisoning in 20 police prefectural jurisdictions. Every case of benzodiazepine-associated death had been examined, and specific information had been recorded by medical examiners or coroners.

Data Collection

The initial questionnaire regarding acute drug poisoning was mailed to the critical care departments in Japan at the end of December 1996. Data collection was completed by the end of March 1997.

Data on the postmortem medicolegal cases of benzodiazepine were collected from the "Annual Case Report of Drug and Toxic Poisoning in Japan" published by the National Research Institute of Police Science.

Data Analysis

Demographic data and information regarding the diagnosis, causes of poisoning, agents used, treatment, and outcome were entered into a computerized database.

Statistical Analysis

The chi-square ($\chi^2$) test was used for comparisons between two groups. Differences were considered statistically significant when $p<0.01$.

RESULTS

Cases in Critical Care Departments

Between January and December 1996, 231, 292 patients were admitted to the 59 critical care departments (as determined from the 45% response to the questionnaire) in Japan as medical and surgical emergencies. During this period, 669 of the patients were admitted with acute poisoning following ingestion of benzodiazepines, of which 67 (10.0%) cases
were accidental. The majority of patients (553, 82.7\%) were admitted after deliberate self-poisoning with drugs.

According to their past medical history or formal psychiatric assessment, 396 patients (59.2\%) had psychiatric illnesses, whereas only 23 of the accidental drug poisoning patients had a history of psychiatric illness (Table 1).

**Gender and Age Distribution**

The female : male ratio was 2.4 : 1. The proportions of female cases among cases of deliberate self-poisoning, accidental poisoning, malicious poisoning, and poisoning of unknown nature were 72.0\%, 60.3\%, 50.0\% and

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**Table 1.** Number and proportion of patients with psychiatric illnesses admitted to critical care departments for acute benzodiazepine poisoning and postmortem medicolegal cases of benzodiazepine poisoning during 1996.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Deliberate self-poisoning</th>
<th>Accidental poisoning</th>
<th>Malicious poisoning</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with psychiatric illnesses</td>
<td>346</td>
<td>23</td>
<td>1</td>
<td>26</td>
<td>396</td>
</tr>
<tr>
<td>without psychiatric illnesses</td>
<td>184</td>
<td>40</td>
<td>1</td>
<td>18</td>
<td>243</td>
</tr>
<tr>
<td>unknown</td>
<td>23</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>553 (82.7%)</td>
<td>67 (10.0%)</td>
<td>2 (0.3%)</td>
<td>47 (7.0%)</td>
<td>669 (100.0%)</td>
</tr>
<tr>
<td>Postmortem medicolegal cases</td>
<td>79 (83.2%)</td>
<td>12 (12.6%)</td>
<td>2 (2.1%)</td>
<td>2 (2.1%)</td>
<td>95</td>
</tr>
</tbody>
</table>

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*Fig. 1. Catchment area in this study.*

● = 59 critical care departments; □ = 27 police prefectural jurisdictions
Patients with acute drug poisoning

![Gender and age distribution of 658 patients with acute benzodiazepine poisoning in critical care departments (there were no gender or age records for 11 patients) and 95 postmortem medicolegal cases of benzodiazepine ingestion.](image)

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0~9</td>
<td>50</td>
</tr>
<tr>
<td>10~19</td>
<td>100</td>
</tr>
<tr>
<td>20~29</td>
<td>200</td>
</tr>
<tr>
<td>30~39</td>
<td>150</td>
</tr>
<tr>
<td>40~49</td>
<td>100</td>
</tr>
<tr>
<td>50~59</td>
<td>70</td>
</tr>
<tr>
<td>60~69</td>
<td>50</td>
</tr>
<tr>
<td>70~79</td>
<td>30</td>
</tr>
<tr>
<td>80~89</td>
<td>20</td>
</tr>
<tr>
<td>90~99</td>
<td>10</td>
</tr>
</tbody>
</table>

Postmortem medicolegal cases

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0~9</td>
<td>5</td>
</tr>
<tr>
<td>10~19</td>
<td>10</td>
</tr>
<tr>
<td>20~29</td>
<td>20</td>
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<tr>
<td>30~39</td>
<td>30</td>
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<tr>
<td>40~49</td>
<td>40</td>
</tr>
<tr>
<td>50~59</td>
<td>50</td>
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<td>60~69</td>
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<td>70~79</td>
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</tr>
<tr>
<td>80~89</td>
<td>80</td>
</tr>
<tr>
<td>90~99</td>
<td>90</td>
</tr>
</tbody>
</table>

Fig. 2. Gender and age distribution of 658 patients with acute benzodiazepine poisoning in critical care departments (there were no gender or age records for 11 patients) and 95 postmortem medicolegal cases of benzodiazepine ingestion.

- = female; □ = male

62.2%, respectively. The most prevalent age group of patients with acute benzodiazepine poisoning of both sexes was 20 to 29 years (Fig. 2). Most of the subjects were relatively young (63.7% under the age of 40, Fig. 2).

Seasonal Incidence

Cumulative data for January to December 1996 show that the maximum number of admissions (n = 67) for acute benzodiazepine poisoning occurred in August, and the lowest number (n = 39) in December (Fig. 3).

Drugs Used

In this study of 669 cases, 289 patients (43.2%) took benzodiazepines alone and 369 patients took a combination of benzodiazepines and other drugs (in 11 patients the combination drug could not be identified). Antidepressants (26.5%) were the most frequently encountered drug category among the 669 cases surveyed. Only one benzodiazepine was ingested by 62.6% of the patients, 20.2% ingested two, and 9.4% ingested three or more. The mean number of benzodiazepines ingested was 1.47. A total of 937 benzodiazepines doses was recorded for the 669 patients. The most common benzodiazepine ingested was flunitrazepam (16.8%), followed by triazolam (15.5%), etizolam (11.4%), nitrazepam (11.0%), brotizolam (9.8%), alprazolam (5.7%), diazepam (5.4%), and estazolam (5.1%). These drugs accounted for 80.7% of the benzodiazepines ingested (Table 2).

In total, 83.3% of patients took legitimately prescribed medications and 1 of these patients had prescribed the drug for herself.

Toxicological Analysis

Only 115 patients (17.2%) had undergone plasma or urinary drug screening tests by Triage® (n = 74), REMEDI® (n = 30), fluorescence polarization immunoassay (n = 17), Toxilab® (n = 17), or high-performance liquid chromatography (n = 5). Some of the patients were tested by two or three methods.

Treatment

Gastrolavage was performed in 523 patients (78.2%), and 118 patients (17.6%) were given flumazenil as a specific antidote. Forty-one patients (6.1%) were subjected to blood purification procedures, including direct hemoperfusion (n = 39), hemodialysis (n = 1), and peritoneal dialysis (n = 1).
Acute Benzodiazepine Poisoning

Fig. 3. Percentages of monthly admissions for acute benzodiazepine poisoning and the monthly benzodiazepine-associated death rate and monthly temperature in Tokyo, Japan.

- critical care group (n=644); postmortem group (n=95)

Duration of Stay in the Critical Care Department
The average length of stay in the critical care department was 3.9 days (range, 1 to 164 days) (Fig. 4). There was a significant difference in the average length of stay in the critical care department between cases of poisoning by ingestion of benzodiazepines alone (2.4 days) and poisoning by benzodiazepines in combination with other drugs (5.1 days). The majority of patients (83.3%) recovered completely and were discharged from the critical care department.

Hospital Deaths
During 1996, six deaths (0.9% of total), four of them women, occurred in the critical care departments as a result of acute poisoning following ingestion of benzodiazepines in combination with other classes of drug (Table 3). Five of them, however, were cases of cardiopulmonary arrest on arrival. The age of the six patients ranged from 23 to 47 years (mean: 33.7 years).

Postmortem Medicolegal Cases
Between January and December 1996, 224 cases were reported to the National Research Institute of Police Science as cases of acute drug poisoning. Ninety-five were postmortem medicolegal cases of acute benzodiazepine poisoning, 12 (12.6%) of which were cases of accidental drug poisoning. The majority of cases (83.2%) were cases of deliberate self-poisoning with drugs (Table 1).

Gender and Age Distribution
The female : male ratio was 1.1 : 1. Among the cases of deliberate self-poisoning, accidental poisoning, homicidal poisoning, and poisoning of unknown nature, the proportion of female cases was 53.2%, 50.0%, 50.0%, and 50.0%, respectively. The most prevalent age group in postmortem medicolegal cases of both sexes was 30 to 39 years (Fig. 2).

Seasonal Incidence
Cumulative data from January to December 1996 show that the maximum numbers of benzodiazepine-associated deaths (n=10) occurred in January, February, and August, and the lowest number (n=5) in September (Fig. 3). The seasonal incidence of acute benzodiazepine poisoning in this study showed that the proportion of monthly admissions to critical care departments increased as temperature rose, but no such seasonal pattern was found in the postmortem group.

Drugs Used
Of the 95 cases surveyed, 26 were considered to be deaths as a result of ingestion of benzodiazepines alone (27.4%), and the remainder (n=69) as deaths due to ingestion of benzodiazepines in combination with other classes of drugs, with neuroleptics (53.7%) being the most frequently implicated drug category in the cases surveyed (Table 2). According to the “Annual Case Report of Drug and Toxic Poisoning in Japan”, only one benzodiazepine was ingested.
Table 2. Distribution of the number and proportion of poisoning cases following ingestion of benzodiazepines during 1996.

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Cases in critical care departments</th>
<th>Postmortem medicolegal cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. (%)</td>
<td>N. (%)</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>flunitrazepam</td>
<td>157 (16.8%)</td>
<td>39 (26.5%)*</td>
</tr>
<tr>
<td>triazolam</td>
<td>145 (15.5%)</td>
<td>16 (10.9%)</td>
</tr>
<tr>
<td>etizolam</td>
<td>107 (11.4%)</td>
<td>14 (9.5%)</td>
</tr>
<tr>
<td>nitrazepam</td>
<td>103 (11.0%)</td>
<td>17 (11.6%)</td>
</tr>
<tr>
<td>brotizolam</td>
<td>92 (9.8%)</td>
<td>12 (8.2%)</td>
</tr>
<tr>
<td>alprazolam</td>
<td>53 (5.7%)</td>
<td>5 (3.4%)</td>
</tr>
<tr>
<td>diazepam</td>
<td>51 (5.4%)</td>
<td>9 (6.1%)</td>
</tr>
<tr>
<td>estazolam</td>
<td>48 (5.1%)</td>
<td>14 (9.5%)</td>
</tr>
<tr>
<td>others</td>
<td>181 (19.3%)</td>
<td>21 (14.3%)</td>
</tr>
<tr>
<td>total</td>
<td>937</td>
<td>147</td>
</tr>
<tr>
<td>Categories of drugs other than benzodiazepines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neuroleps</td>
<td>166 (24.2%)</td>
<td>51 (28.7%)</td>
</tr>
<tr>
<td>cyclic antidepressants</td>
<td>116 (16.9%)</td>
<td>17 (9.6%)</td>
</tr>
<tr>
<td>barbiturates</td>
<td>90 (13.1%)</td>
<td>35 (19.7%)</td>
</tr>
<tr>
<td>antihistamines</td>
<td>76 (11.1%)</td>
<td>31 (17.4%)</td>
</tr>
<tr>
<td>other CNS depressant</td>
<td>74 (10.8%)</td>
<td>11 (6.2%)</td>
</tr>
<tr>
<td>other antidepressant</td>
<td>61 (8.9%)</td>
<td>10 (5.6%)</td>
</tr>
<tr>
<td>others</td>
<td>103 (15.0%)</td>
<td>23 (12.9%)</td>
</tr>
<tr>
<td>total</td>
<td>686</td>
<td>178</td>
</tr>
</tbody>
</table>

The sum of the numbers is greater than 669 or 95 because some patients took more than one drug.

* There was a significant difference in comparison with the rest of the drugs between the critical care group and the postmortem group, (p<0.01). CNS = central nervous system.

among the 65.3% of the postmortem medicolegal cases, with two being ingested in 21.1%, and three or more in 13.7%. The mean number of benzodiazepines ingested was 1.48.

The most common benzodiazepine ingested was flunitrazepam (26.5%), followed by nitrazepam (11.6%), triazolam (10.9%), brotizolam (9.8%), etizolam (9.5%), estazolam (9.5%), alprazolam (5.7%), and diazepam (5.4%). These drugs accounted for 85.7% of the benzodiazepines ingested (Table 2).

Toxicological Analysis

Benzodiazepines or their major metabolites were present in the blood or urine of the 22 deceased (23.2%) subjects, as demonstrated by toxicological analysis.

Statistical Analysis in the Two Groups

Demographic Characteristics

There was a difference in predominance of female patients among cases of deliberate self-poisoning: 72.0% (n=399) in the critical care group and 53.2% (n=42) in the postmortem group (χ²=11.82, 1 d.f., p<0.001).

Drugs Used

There were significant differences between the two groups, in the proportion of patients who ingested benzodiazepines in combination with other classes of drugs: 55.2% (n=369) in the critical care group and 72.6% (n=69) in the postmortem group (χ²=9.347, 1 d.f., p<0.002). Among the benzodiazepines, there was a significant difference in the frequency of ingestion of flunitrazepam between the critical care group and the postmortem group (χ²=8.197, 1 d.f., p<0.004) (Table 2).

DISCUSSION

The aim of this study was to investigate trends in serious acute poisoning with benzodiazepines and to
explore the sources of the drugs taken by subjects attempting suicide, because there had been no retrospective analyses of acute benzodiazepine poisoning in Japan. We also compared cases of acute benzodiazepine poisoning in critical care departments with postmortem medicolegal cases of benzodiazepine poisoning not sent to critical care departments as a means of analyzing lethal benzodiazepine poisoning.

In both groups, the majority of the benzodiazepine poisoning cases were deliberate self-poisoning (Table 1). The demographic characteristics of the cases of deliberate self-poisoning showed that the percentages of female cases differed in the critical care group (72.0%) and the postmortem group (53.2%), although the proportion of cases of deliberate self-poisoning was similar in both groups. Thus, presumably many female cases in the critical care group were attempts intended only as a gesture or to seek attention.

The majority of patients in both the critical care group (82.8%) and the postmortem group (76.8%) had not undergone plasma or urinary drug screening tests. The lack of facilities for drug identification may result in serious diagnostic error or wrong estimations of the severity of the poisoning, as well as impede scientific progress in research on acute drug poisoning\textsuperscript{15-16}. Although rapid drug quantification methods may not be widely available at present, further toxicological analysis is needed to clarify trends in acute benzodiazepine poisoning. The pharmacological and toxicological effects of drugs are reflected by their blood concentrations, and determi-
nations are therefore useful in predicting the clinical outcome17-18). Accordingly, quantitative blood determinations of benzodiazepines are useful in patients not only to confirm the clinical diagnosis and select appropriate treatment19), but in patients presenting with coma of unknown origin as well. Techniques available to measure blood concentrations of benzodiazepines include thin-layer chromatography, gas chromatography with or without mass spectrometry, high-performance liquid chromatography, radioimmunoassay, enzyme-mediated immunoassay, and fluorescence polarization immunoassay20-22). In addition, we found that the majority of cases, i.e., 62.6% and 65.3%, in the two groups, respectively, took only one benzodiazepine. When the patients took only one benzodiazepine, fluorescence polarization immunoassay was useful in promptly (within 30 minutes) determining the benzodiazepine concentrations in the blood of acute poisoning patients23).

Efforts to decrease the morbidity and mortality of acute drug poisoning should target drugs taken frequently in serious and lethal overdoses24). This study confirmed that flunitrazepam, triazolam, etizolam, and nitrazepam were the main agents ingested in acute benzodiazepine poisoning in both the critical care and postmortem groups (Table 2). More specifically, flunitrazepam was the derivative most commonly used in the postmortem group. The statistically significant difference was considered to be caused by the characteristics of the pharmacokinetic parameters of flunitrazepam, which has a short time to peak and a relatively long elimination half-life24). In other words, rapid onset and prolonged coma contribute to successful suicide.

We observed a similar pattern of combination drug intake in both groups: central nervous system depressants and cyclic antidepressants were among the commonly ingested drugs in combination with benzodiazepines (Table 2). However, there was a significant difference in the proportion of patients who ingested benzodiazepines in combination with other classes of drugs in both groups. The severity of benzodiazepine poisoning was potentiated by co-ingestion of other central nervous system depressants9) or cyclic antidepressants25), and the statistically significant difference was probably the consequence of the potentiation. Furthermore, the average length of stay in critical care departments was prolonged when combined with other drugs: the time needed to recover depends on the co-ingestion of other central nervous system depressants or cyclic antidepressants (Fig. 4).

Six deaths (0.9% of total) were recorded in the critical care departments as a result of poisoning following ingestion of benzodiazepines in combination with other drugs (Table 3), but five of them were cases of cardiopulmonary arrest on arrival (Table 3). These findings are consistent with the results of other studies14,26). Thus, the patients admitted to hospitals rarely died as a result of poisoning due to benzodiazepine ingestion alone. We suspect that the fatal cases of benzodiazepine poisoning may have occurred due to prolonged comatose periods associated with respiratory suppression, asphyxia due to aspiration or pharyngeal obstruction, and hyperkalemic arrest due to rhabdomyolysis outside the hospital in persons who were not discovered.

Most (90.6%) benzodiazepines used for deliberate self-poisoning by patients admitted to critical care departments had been prescribed by physicians and given to them by a pharmacist. A substantial number of patients undergoing psychiatric treatment at the time of death was noted among the diazepam cases surveyed27), and van Heeringen and Jannes suggest that outpatient treatment can be an efficient method of primary prevention of suicidal behavior28). There is also the possibility that individuals who attempt suicide obtain a large quantity of benzodiazepines by intentionally consulting multiple physicians. Thus, to prevent acute benzodiazepine poisoning, it is also important to keep subjects with suicidal tendencies from obtaining large doses of benzodiazepines. Accordingly, physicians should be more cautious in regard to compliance and suicidal ideation when prescribing benzodiazepines to outpatients, and pharmacists should share patient's prescription drug records to create a system for regulating the use of benzodiazepines (especially flunitrazepam, triazolam, etizolam, and nitrazepam).

**CONCLUSION**

The characteristics of the benzodiazepine poisoning seen in the critical care departments and postmortem medicolegal cases are almost the same as in most other countries: a predominance of female patients and the younger age group, although the majority of cases with benzodiazepine poisoning were cases of deliberate self-poisoning.

Benzodiazepines are thought to be rather safe drugs, even in large overdoses. However, they are not always devoid of serious toxic effects. If the person is not discovered, death related to benzodiazepines can occur due to prolonged comatose periods associated with respiratory suppression, asphyxia due to aspiration or pharyngeal obstruction, and hyperkalemic arrest due to rhabdomyolysis.
Acute benzodiazepine poisoning in Japan should be considered a kind of iatrogenic disease, because benzodiazepines are available only by prescription, and in most cases of poisoning are prescribed by a physician and given to the patient by a pharmacist. We regard careless prescriptions and routine dispensation of benzodiazepines as being among the reasons why the number of cases of acute poisoning fails to decrease. Therefore, to prevent acute benzodiazepine poisoning, it is important to control the clinical use of benzodiazepines more appropriately by monitoring medication use and by counseling of patients by health care professionals.

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References

わたなべ 三木、石黒、小野、岩本、大谷、大村

要旨 本研究における急性ベンゾジアゼピン系薬物中毒症例733例を対象に、薬物の種類、中毒の程度、発症の部位、治療の経過を調査した。結果、中毒者733例中、ベンゾジアゼピン系薬物を服用したものは691例であり、その内訳はテトラハイドロベンゾジアゼピン系569例、ベンゾジアゼピン系122例であった。また、中毒の程度は軽度338例、中等度354例、重度41例であり、発症の部位は意識229例、心臓220例、呼吸137例、神経系統60例、消化器系31例、循環器系30例、皮膚30例、筋系16例、体液代謝15例、腫瘍10例、生殖器系10例、運動神経10例、耳鼻咽喉頭器9例、腎臓8例、小児8例、精神神経系6例、神経病学的7例、脳神経系6例、脳神経5例、耳鼻咽喉頭器4例、心臓3例、第二心音3例、肺4例、循環器系3例、皮膚3例の順であった。さらに、治療の経過においては、ベンゾジアゼピン系薬物を服用したものは691例で、その内訳はテトラハイドロベンゾジアゼピン系569例、ベンゾジアゼピン系122例であった。また、治療の方法は薬物療法398例、手術41例、島際療法26例、物理療法24例、ステンサリング14例、おおあたの術2例、石黒の術1例、総合治療1例、保険経過が3例であった。したがって、本研究は急性ベンゾジアゼピン系薬物中毒の発症、治療の経過を詳細に調査したものである。

キーワード：急性ベンゾジアゼピン系薬物中毒、治療、治療の経過、発症の部位、薬物療法、手術

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