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Social, Toxicological and Meteorological Data on Suicide Attempts

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Summary. A sample of 151 patients, admitted to an Intensive Care Unit after attempted suicide by poisoning was analysed with regard to age, drugs consumed, possible causal factors and influence of weather. The German Weather Service provided the meteorological data. Mean age of the patients was 37.6 years. The patients had taken barbiturates, aggressive chemicals, tranquillizers or a combination of drugs (47%). Alcohol had been taken in addition to the drugs in 24%, which might indicate a trigger function. The main provoking causes for the suicide attempts were conflicts in partnerships and occupational problems. Some 15% of the patients had previously diagnosed psychiatric disorders. There was a significant positive correlation between the time of attempted suicide and the weather parameters "stable upslide, labile upslide, fog, thunderstorm, warm air, upslide and weather drier than on the 2 preceding days". Significantly fewer attempts than expected occurred with "low pressure and trough situation, labile ground layer-upslide above, subsidence or downslide motion". Apart from individual provoking factors, such as the reaction to conflicts and the spectrum of reactions, exogenous factors like weather must be considered as important for the timing of suicide attempts. These results may be of relevance for suicide prevention.

Key words: Suicide attempt – Weather – Biometeorology – Drug intoxication

Introduction

Suicide and attempted suicide are complex phenomena with increasing importance, e.g. the rate of suicides in the Federal Republic of Germany is of the order of 20 per 100000 inhabitants (Philipp 1982) and the rate of suicide attempts approximately 95 per 100000 inhabitants (Ott and Ingbert 1974).

Of the people in Europe 30% have severe weather-induced complaints (Ranscht-Froemsdorff 1976); climatic influences on the incidence of myocardial infarction (Marty and Vogler 1980; Ruhenstroth-Bauer et al. 1985) and on the fibrinogen content of human blood (Tromp 1972) have been reported. Moreover, there might be a relation between weather and suicide. The purpose of our study was to analyse a defined group of suicides with regard to social factors, drugs consumed, causes and possible influences of weather on the date of suicide.

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Methods

Between 1979 and 1982, 151 patients were admitted to the Intensive Care Unit of the University of Düsseldorf after attempted suicide by poisoning, and all of them have been included in this retrospective study. Common characteristics of these patients were a suicide attempt by intoxication, a life-threatening health condition and the necessity of Intensive Care, and concerning these factors they formed a homogeneous group. They represented 8% of all patients treated in the Intensive Care Unit during this period. To examine the relationship between suicide and weather conditions the "biosynoptic daily analysis" of the German Weather Service was used. The weather data for each day were transferred to a numerical code, including more than 46 weather parameters which described the "type of weather", the "atmosphere close to earth", the "change of weather", "temperature and moisture", "fog" and "thunderstorm". The frequency of each weather parameter during the observation period was then compared with the incidence of that parameter at the time of the suicide attempts. Statistical analysis was done by using the χ^2 test, the asymptotic test (Lienert 1973) and analysis of variance. A P value of less than 0.05 was considered to be significant. The asymptotic test allowed a comparison between observed and expected data and is based on an approximation to the normal distribution. The statistical testing variable "z" was estimated from the following Eq.:

$$z = \frac{S_{wp} - \left(S_{total} \times \frac{n}{N}\right)}{\sqrt{S_{total} \times \frac{n}{N} \times \left(1 - \frac{n}{N}\right)}}$$

S_{wp} = total number of each weather parameter present on days with suicide attempts
S_{total} = total number of suicide attempts (151)
n = number of each weather parameter during the observation period
N = total number of days of the observation period (1,461)

The zero hypothesis was that no difference exists between the observed and expected frequency of suicide attempts in relation to different weather situations. With z values greater

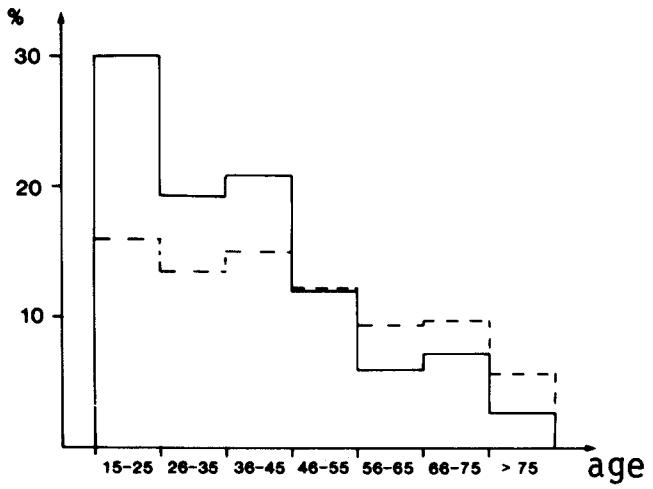

Fig. 1. Distribution of age among patients (———) who have attempted suicide and the age structure of the West German population in 1982 (– – –)

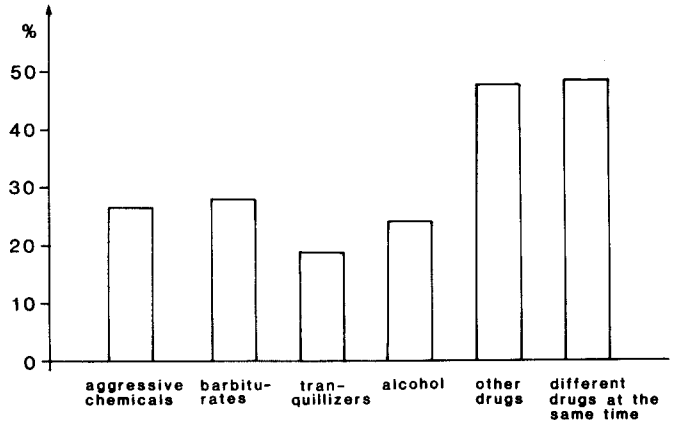

Fig. 2. Quantity (%) of different drugs taken with suicidal intention

than 1.65 or smaller than −1.65 the zero hypothesis was rejected ($P < 0.05$).

Results

The distribution of age among the patients and the age structure of the West German population (Statistisches Bundesamt 1981) are shown in Fig. 1. The mean age of the patients was 37.6 years, with a peak between 15 and 25 years. Comparing the two distributions, the higher proportional suicide rate of people below 45 years is obvious. The proportion of women (62%) in our study was significantly larger than that of men (38%). The patients stayed an average of 4.9 days in the Intensive Care Unit, but this time was significantly longer (8.1 days) for those patients who died. Mortality following the suicide attempt was 15.9%; it was lowest (8.7%) in the group of patients aged below 25 years, and increased to 19.2% in the group between 25 and 50 years and 19.4% in the group over 50 years. Previous suicide attempts were known to have occurred in 13% of the patients.

Figure 2 shows the frequency of different drugs, taken with the intention of suicide. Suicide was attempted using barbiturates (28%), aggressive chemicals (27%), tranquillizers (19%)

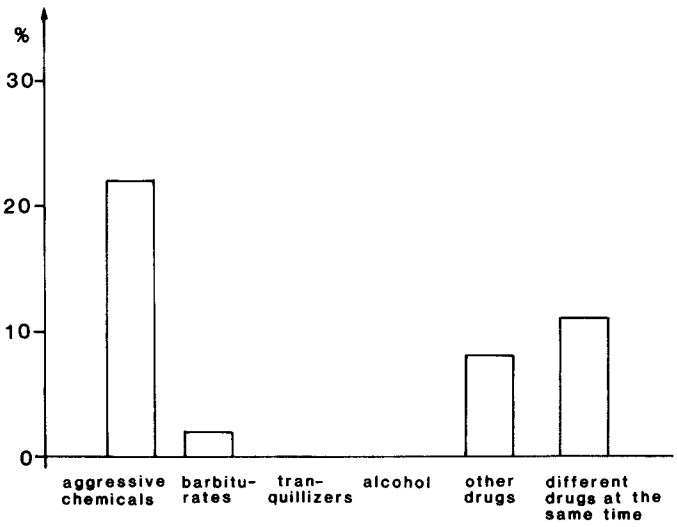

Fig. 3. Lethality (%) after drug overdose

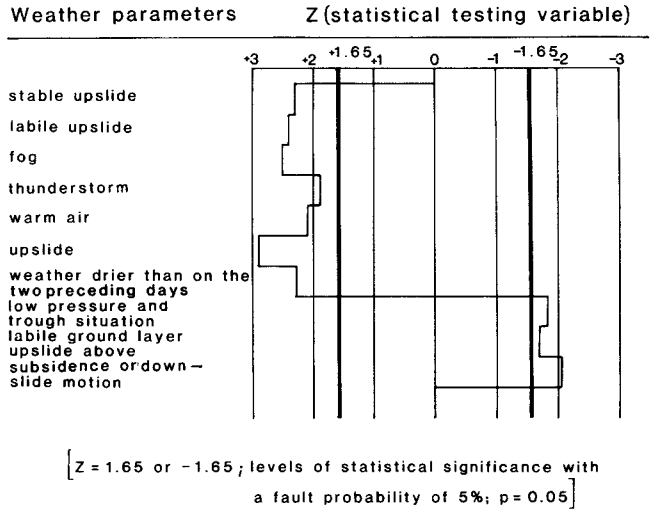

Fig. 4. Influence of weather on the date of suicide attempt. A z value above 1.65 means a positive relation and a z value below −1.65 means a negative one between the described weather situation and the frequency of suicide attempts

and a combination of drugs taken simultaneously (47%). Alcohol had been taken in addition to the drugs in 24% of cases.

Figure 3 illustrates the lethal potency of the different drugs. The highest mortality was observed after ingestion of aggressive chemicals such as hydrochloric acid and carbon tetrachloride. A significantly lower mortality was associated with barbiturates and no death was seen following ingestion of tranquillizers. With two or more drugs taken at the same time, mortality was 11%.

The main provoking causes for a suicide attempt were conflicts in partnership (22%), difficulties connected with work (2%) or other interpersonal conflicts (12%). Of the patients 15.2% had previously known psychiatric disorders, including endogenous depression and neurotic illness. The rate of previous suicide attempts in this group was not significantly different from the rate in the total group.

Figure 4 shows the main results concerning the influence of weather on the timing of the suicide attempts. A significant positive relation was found between the date of attempted

suicide and the parameters "stable upslide, labile upslide, fog and thunderstorm" and the summarized parameters "warm air, upslide and weather drier than on the 2 preceding days". The static "atmosphere close to earth", that is the atmosphere up to an altitude of 2 km, had no significant influence on suicide attempts. Significantly fewer attempts than expected occurred with "low pressure and trough situation, labile ground layer-upslide above" and the summarized parameters "subsidence or downslide motion". The seasons also showed significantly ($P < 0.05$) different suicide rates. There were fewer suicide attempts on average in winter (17%) and more during spring (31%). During the same weather conditions the frequencies of suicides of both sexes were not significantly different.

Discussion

The higher frequency of suicide attempts for persons aged under 45 years might be due to limited ability handling psychosocial conflicts in younger people, compared with elderly.

In this study, female attempters outnumbered male by 2 to 1. On the other hand there is a sex ratio of 1:2 (women:men) among completed suicides in the Federal Republic of Germany (Köhler 1985). This inverse relationship may indicate a higher self-destructive tendency in men, but a more marked demonstrative tendency in women. Fox and Weissman (1975) observed the same relationship and concluded, "that attempts by pill overdose were the most impulsive, had the least intent to kill, and were motivated towards obtaining significant attention from others". The lower lethality in the group of patients younger than 25 years might be explained by their better physical condition and less consequence in the realization of suicide in younger people. The high rate of additional ingestion of alcohol might point to a trigger function of alcohol.

Half of the patients in this study had taken several drugs at the same time. A large proportion of intoxications using a combination of drugs was also reported by Fox and Weissmann (1975), Ziller (1980) and Hansen and Wang (1984). Oltmanns et al. (1983) found 33% mixed intoxications in patients who were admitted to hospital with a diagnosis of alcohol intoxication. Because of the high frequency of a "drug cocktail", a toxicological screening is of great importance in treating such patients in an Intensive Care Unit.

That no deaths occurred after taking tranquillizers is in keeping with the often-used term 'safe-drug', concerning their lack of lethal potency. The increase in suicide attempts with tranquillizers and a decrease in the use of barbiturates between 1979 and 1982 is striking. Comparable results have been reported by Ziller (1980). This might be due to a change in medical prescribing habits, most physicians nowadays prescribing tranquillizers instead of barbiturate derivatives in the great majority of cases.

A powerful influence of changes in weather on suicide frequency has been demonstrated by Faust (1976). Since simple meteorological variables such as "static air pressure", "temperature" and "humidity" have given no clear answer to the relationship between suicide and weather (Digon and Bock 1966), dynamic parameters from the "biosynoptic daily weather analysis" were included in our study. The meteorologic term "upslide" means that two different air layers collide and that one layer slips over the other, resulting in cloud formation. These procedings are additionally characterized by the adjectives "stable", "labile" and so on. The changes in the atmosphere are located within low pressure areas and transitional regions between high and low pressure areas. "Downslide motion", describes a collision of different layers with descending air layers and disappearance of clouds.

The up- or downslide motion of air layers seems to be able to induce weather-related health complaints or to have an influence on the date of suicide attempt before any alteration of the "atmosphere close to earth" could be observed. For this reason, Jendritzky (1975) considered that the weather factors to which humans are sensitive must be propagated with a velocity much higher than the velocity of air layers, and rapid changes of air pressure caused by the motion of air layers would comply with this condition.

In simplistic terms we may say that the incidence of suicide attempts is increased when the weather is fine or during extreme weather situations such as fog or thunderstorm. Comparable findings, obtained from a series of 1327 suicides in Hamburg, have been published by Beleke and Klein (1970). Schramm (1968) found in Berlin positive relations between "higher temperatures than normal" and with "weather conditions with warm air" and suicide attempts.

A possible explanation of our data relates to the discrepancy between the sombre mood of a person planning suicide and the obvious harmony of his surroundings when the weather is fine. This awareness and situation of a lonely person seeing the world around himself in real harmony is excellently described by Goethe in the Easter scene of his drama "Faust" (part I).

Faust (1976) defined meteorological parameters which might be critical for patients in relation to the different psychiatric diagnoses. Referring to his results, "foehn" and "warm front" seem to constitute a risk for patients with depression, schizophrenia or abuse of alcohol. Subsequently, Large and Johnson (1980) observed a positive correlation between sunshine duration and the following diagnoses on acute admission in a psychiatric hospital: reactive depression, personality deficiency, manic depression and paranoia. Within our study a diagnostic subgrouping was not performed because only a few patients had the same psychiatric diagnosis, and the subgroups would be too small for a statistical analysis.

The above analysis is based on a statistical comparison between observed and expected frequencies of attempted suicides. Causal relationships naturally cannot be verified by this method. We must bear in mind that suicides are not merely the effect of climatic changes and that the most important component is the individual ability to deal with conflicts. A special type of weather sensibility might, however, be postulated in the pre-suicidal phase. With reference to our results we may distinguish between "weather, conductive to suicide" and " weather, protecting from suicide". The social, toxicological and meteorological data presented here may be of relevance for suicide prevention and therapy, especially in Intensive Care Units.

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