

THE MORTALITY RATE AND CAUSES OF DEATH OF TREATED CHRONIC ALCOHOLICS*

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The mortality rate and causes of death of chronic alcoholics who had received treatment for alcoholism were investigated in a consecutive series of 802 patients admitted between the years 1959 and 1963 to the William Slater Hospital, which is the alcoholic treatment unit of the Department of Psychiatry of the University of Cape Town and Groote Schuur Hospital. Many patients had evidence of associated physical sequelae such as withdrawal symptoms, enlarged livers, ataxia, etc., but if these were so severe as to necessitate treatment in their own right, or if the patient was unlikely to be ambulatory within a few days, they were dealt with in another hospital. Personal, social and psychological factors were enquired into in all cases to determine the patients at highest risk. This study was done in association with an investigation of prognostic factors and results of treatment in chronic alcoholism which will be published later.

MATERIAL

All patients were White chronic addictive alcoholics of many years' standing, 86% being males and 14% females. Ninety percent were between the ages of 30 and 60 years (8% were under 30 years). The average stay in hospital was 18 days, the majority of patients remaining for less than 5 weeks (83%). Treatment consisted of short-term intensive psychiatric care including psychotherapy, chemotherapy including Antabuse, and intensive social case work as described by Walton.¹

Mortality Rate

Of this series, 95 persons died within 6 years of their first admission (86 males, 9 females), i.e. approximately 1 in 8 of all cases admitted. Survival was estimated from the time of first admission to the hospital and in terms of the effective number of persons exposed to the risk of dying in each post-treatment year. The cumulative survival rate, which is an actuarial device used in calculating life expectancy, was then estimated. The results are shown in Table I.

TABLE I. SURVIVAL RATE OF TREATED ALCOHOLICS

Year after admission	No. exposed to risk of dying			Number dying during year			Cumulative survival rate		
	M	F	Total	M	F	Total	M	F	Total
0-1	707	95	802	23	2	25	.9675	.9789	.9688
1-2	675	92	767	27	2	29	.9288	.9623	.9322
2-3	613	84	697	13	3	16	.9091	.9279	.9108
3-4	458	61	519	13	1	14	.8833	.9127	.8862
4-5	321	36	357	3	—	3	.8751	.9127	.8788
5-6	214	23	237	1	1	2	.8710	.8730	.8714
6-7	92	8	100	1	—	1	.8615	—	.8627

Thus, 96.9% can be expected to be alive after 1 year, 93.2% after 2 years, 91% after 3 years, 89% after 4 years, and so on, showing that there is an approximately constant mortality risk in the first few years after treatment. This finding is probably related to the fact that the time

that elapses after hospital treatment makes little difference to the proportion of patients who show improvement in their drinking.^{2,3} Males and females have a somewhat different survival rate, proportionately more females surviving in each post-treatment year, and this is presumably due to the general trend in the population rather than specifically due to alcoholism. Mortality is highest in the first 4 years after treatment (a maximum of 1 in 26 died), and falls off in subsequent years as can be seen from Table II. The probable reason for this is that as alcoholics are notoriously averse to acknowledging their illness, they are already in a serious condition by the time they are admitted and the mortality rate will therefore be high.

TABLE II. MORTALITY IN TREATED ALCOHOLICS: PROPORTION DYING EACH YEAR AFTER FIRST ADMISSION

Year after admission	Death ratio
1st	1 in 30 persons
2nd	1 in 26 "
3rd	1 in 47 "
4th	1 in 35 "
5th	1 in 107 "
6th	1 in 214 "
7th	1 in 92 "

All in all, our average death rate was 26/1,000 persons compared with 8/1,000 of the general population, which compares with Tashiro and Lipscomb's⁴ figure of 26/1,000 in an area with an expected annual death rate of 11/1,000.

The over-all figures compare very closely with those of these investigators, who found a death rate of 1 in 14 in a comparable series of treated male alcoholics in California; the average annual death rate was nearly 2½ times greater than the expected rate. In London, Kendell and Staton⁵ found a mortality rate 5 times that of the expected mortality of the general population, and 18% of their series died within 6-7 years. Nørvig and Nielsen,⁶ in a follow-up study in Denmark, found that 19% had died from 2½ to 5½ years after hospital treatment, and Brenner⁷ found that alcoholics were 3 times as likely to die as the other residents of a comparable group in the Bay area of San Francisco.

The above figures do not take account of age, and age-specific mortality rates were therefore calculated for 5-year age-groups as shown in Table III, and compared with the latest available expectancy rates for the general population. The ratio of the actual to the expected number of deaths is shown in Table III.

The single most important finding was that the over-all death rate of alcoholics is about 4 times that of the expected death rate of the comparable White adult population of South Africa (3.9:1 for males and 4.5:1 for females). This varies in different age-groups from 12.5:1 to 2.1:1, but was much the same for both males and females up to the age of 60. Thereafter the numbers involved were too small to judge. Younger alcoholics have a

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TABLE III. RATIO OF ACTUAL DEATHS TO EXPECTED DEATHS OF TREATED ALCOHOLICS

Age group (years)	Central age	Exposed to risk		Actual deaths		Expected deaths		Ratio of actual to expected deaths	
		M	F	M	F	M	F	M	F
20-24	22	24	1	—	—	—	—	—	—
25-29	27	167	13	5	—	4	—	12.5:1	—
30-34	32	445	39	4	1	1.2	0	8.3:1	10:1
35-39	37	715	90	19	3	2.5	2	7.5:1	15:1
40-44	42	708	98	14	2	3.6	4	8.9:1	5:1
45-49	47	528	68	20	—	4.4	4	4.4:1	—
50-54	52	360	54	10	—	4.7	4	2.1:1	—
55-59	57	115	26	7	2	2.3	3	3.0:1	6.6:1
60-64	62	40	4	1	1	1.2	1	0.8:1	10:1
65-69	67	10	4	1	—	4	1	2.5:1	—
70-74	72	2	—	—	—	—	—	—	—
Total		81		9	20.7	2	Av. 3.9:1	4.5:1	

All comparisons are made with the latest available figures for the general population, that is, at the 1951 Census obtained from the S.A. Life Tables.⁵

very much higher ratio of actual to expected deaths (for males from 25 to 29 years it is 12.5:1), and the proportion diminishes rather suddenly in the mid-forties. The reason for this is probably that other causes of death become more important with increasing age, for example heart disease, and consequently those due to alcoholism diminish proportionately. In addition, deaths due to accidents and suicides form a considerably larger proportion in our sample than in the general population, and these tend to occur at a somewhat younger age.

PERSONAL SOCIAL AND PSYCHOLOGICAL FACTORS

A detailed comparison of personal, social and psychological factors was made of the patients who died and of the survivors. There were no significant statistical differences between these two groups in respect of the following: age, sex, marital state, religion, occupation, schooling, vocational training, previous admissions, source of referral, stability in employment, residential stability, length of drinking history, decline in social status and sexual problems.

On the other hand there was a highly significant association with the patient's cooperation in treatment: those assessed by psychiatrists on admission as being well motivated had a better chance of survival ($p > 0.01$). Similarly, the more willing and active the patient's participation in treatment while in hospital (as assessed from nurses' and doctors' observations), and the more hopeful the prognosis for remaining off alcohol on discharge, the greater was the probability of their survival ($p > 0.05$). This can of course be expected, because treatment causes a decrease in drinking in 39% of cases and so a diminished risk of complications and a lower mortality rate will follow. This applies also to deaths from suicide, since more of the unsuccessfully treated alcoholics committed suicide.

There was a much higher mortality rate among those alcoholics who were physically ill at the time of hospitalization ($p > 0.01$), which could be expected as many had clinical evidence of liver failure, cardiac disease, or other serious illness. There was also a strongly positive association ($p > 0.01$) with difficulties in interpersonal relationships; those who were socially isolated, unable to make good contact with other people, or who lived in very disturbed homes having a higher mortality rate. The reason

for this is uncertain but may be due to the fact that such persons also improved less in terms of drinking, and that the likelihood of suicide was greater.

An attempt was made in all cases to determine if there was an underlying or associated psychiatric condition. Broad diagnostic categories were used, the predominant clinical condition being listed. In a few cases, more than one psychiatric diagnosis were made. The findings were as follows:

TABLE IV. ASSOCIATED PSYCHIATRIC CONDITION

Condition	No. of cases
Psychoneurosis of all types	5
Psychosis including organic brain damage	5
Depression including both reactive and endogenous types	6
Personality disorders	81

(A good proportion of these were in the form of mild personality trait disorders as specified in the Diagnostic Manual of the American Psychiatric Association.)

Over-all, there were no differences in respect of the categories of psychoneurosis and personality disorder between those who died and the survivors, but there were proportionately more psychotics among those who died ($p > 0.05$), which is probably due to their generally poorer prognosis as far as giving up drinking is concerned. Interestingly enough, proportionately fewer patients with depression died ($p > 0.05$) which is the opposite of what might be expected due to the likelihood of suicide; however, the numbers of cases were small, so that no firm conclusions can be based on this finding.

CAUSES OF DEATH

The causes of death were obtained from death certificates in the Department of Births, Marriages and Deaths of the Department of the Interior. In 5 cases no such particulars were available, but adequate details were obtained from hospital folders or relatives. The cause of death as specified on death certificates was sometimes not sufficiently definite, especially when a diagnosis was made without benefit of a postmortem examination, and for this reason no attempt was made to discriminate too finely between pathological entities, large general groupings such as 'cardiac disease' being used.

Cardiac disease accounted for the largest number of deaths (26 cases). Coronary artery disease was stated as the cause of death in 24 of them—all of whom were men—although some may well have been cases of alcoholic cardiomyopathy. This constitutes 25.3% of the deaths in our series, compared with 26.7% of deaths due to this cause in the general population for similar age-groups,⁹ and indicates that there is no greater likelihood among alcoholics of dying of coronary artery disease. Two patients died of congestive cardiac failure, one of whom was a woman. Tashiro and Lipscomb⁴ found that 23% of their patients died of these causes.

Accidents caused 15% of the total number of deaths (12 cases), compared with 3.5% in comparable age-groups in the White population of Cape Town,¹⁰ i.e. 4 times more

than in the general population. Seven deaths were due to motor accidents, the remainder being due to drowning (2), head injuries (2) and suffocation (1).

Suicide accounted for 11 deaths, 6 being due to gunshot wounds and 5 to various other causes (11.6% of deaths in the series). Suicide was also suspected in a further 4 cases who were said to have died from accidents but may have contrived to make the death appear accidental. In all, 1.37% of our series of treated alcoholics committed suicide, compared with 0.005% in comparable age-groups in the White population of Cape Town and 0.027% among males and 0.007% among females in the total White South African population. Males are in the great majority, only one of our suicides being a female. These findings correspond with those of other investigators. Brenner⁷ found suicides to be 2½ times as common among alcoholics, Kendell and Staton⁵ found that 8% of their treated alcoholics committed suicide, and Kessel and Grossman¹¹ reported 2 series in which 7% and 8% of the males who had been treated in a psychiatric hospital killed themselves within a few years. Nørvig and Nielsen⁶ found that 7% of alcoholics treated in hospital had committed suicide within 3½ years, and Lemere¹² found that 11% of 500 patients whose drinking had been a problem had committed suicide.

These rates are all enormously high when compared with the normal population; for instance, Kessel and Grossman¹¹ found the suicide rate among alcoholics to be 75-85 times higher than the expected figure. Kendell and Staton⁵ reported a rate of 58 times higher than expected, and in our own series the figure was approximately the same (60-70 times). All in all, therefore, 24.1% of all deaths in the present series were due to violent causes compared with 8.7% in the normal population.

Medical conditions directly attributable to the effects of alcohol caused death in at least 18 cases, i.e. 19% of deaths in our series. The most common causes were cirrhosis of the liver and hepatic failure with or without oesophageal varices (15 cases). Cirrhosis of the liver alone accounted for 1.87% of deaths of treated alcoholics compared with 0.007% of deaths in the general population, and 0.014% of the total deaths among Whites in Cape Town during 1966. Delirium tremens accounted for a further 3 cases. Other causes of death were as follows: lobar pneumonia 3 cases; cerebral haemorrhage and malignant melanomatosis, 2 cases each; perforated peptic ulcer, bronchial pneumonia, pulmonary tuberculosis, ruptured aortic valve, uraemia, carcinoma of the oesophagus, status epilepticus, carotid artery thrombosis, 1 case each. The cause of death was undetermined in 2 cases.

Note that there was a distinct difference between the causes of death in males and females, for while the majority of males died of coronary heart disease, suicide or accidents, only 2 out of the 9 women died of cardiac conditions, and only 2 from violence.

COMMENTS

This investigation shows conclusively that the prolonged excessive use of alcohol is associated with a diminished life expectancy. The figures are quite alarming, and were

the full story told, they might be even more so because this investigation only took account of entrenched chronic alcoholics admitted to an institution. Chronic alcoholism takes years to develop and, during the process, heavy drinkers are obviously more exposed to a variety of misadventures, e.g. alcohol is responsible for over half the deaths on Australian roads and a substantial proportion of fatal accidents from other causes.¹³ Le Roux and Smith¹⁴ showed, on the basis of 1,739 medico-legal autopsies in the Cape Peninsula, that at least 64% of all adult victims of homicide and 50% of adult victims of traffic accidents had consumed alcohol shortly before their deaths.

The present investigation has shown that motivation for and participation in treatment, and the prevention of suicide, accidents and liver disease in heavy drinkers, are likely to be the most productive areas to work in to reduce the high mortality. The resources of preventive medicine need to be brought to bear to reduce the hazard, and should include public information campaigns to encourage alcoholics to come earlier and more earnestly for treatment. Special attention should be given to those who are at highest risk, such as young chronic alcoholics and those with psychosis or suicidal inclinations or who are particularly isolated socially. Concomitant physical illness, especially developed liver disease, is also an indication for special concern.

SUMMARY

Chronic alcoholics who were treated in hospital for alcoholism showed an over-all mortality rate 4 times that of the comparable general population on follow-up from 1 to 6 years later. This was even higher among the younger age-groups. The mortality risk is approximately equal in each post-treatment year. The better the motivation for and participation in treatment for chronic alcoholism, the greater the survival rate, and those alcoholics with the most interpersonal difficulties died soonest. The chief causes of death were cardiac disease (25.3%), accidents (12.6%) and suicides (11.5%), the last two occurring more often than in the general population, as did deaths from cirrhosis of the liver.

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REFERENCES

- Walton, H. (1961): *Amer. J. Psychiat.*, **118**, 410.
- Gerard, D. L. and Saenger, G. (1959): *Quart. J. Stud. Alcohol*, **20**, 620.
- Gibbins, R. J. and Armstrong, J. D. (1957): *Ibid.*, **18**, 429.
- Tashiro, M. and Lipscomb, W. R. (1963): *Ibid.*, **24**, 203.
- Kendell, R. E. and Staton, M. C. (1966): *Brit. Med. J.*, **2**, 1671.
- Nørvig, J. and Nielsen, B. (1956): *Quart. J. Stud. Alcohol*, **17**, 633.
- Brenner, B. (1967): *Ibid.*, **28**, 517.
- South African Life Tables (1957): Pretoria: Government Printer.
- Bureau of Statistics (1964): *Statistical Year Book, Republic of South Africa*. Pretoria: Government Printer.
- Medical Officer of Health, City of Cape Town (1966): Annual Report.
- Kessel, N. and Grossman, G. (1961): *Brit. Med. J.*, **2**, 1641.
- Lemere, F. (1953): *Amer. J. Psychiat.*, **109**, 674.
- Derrick, E. H. (1967): *Med. J. Aust.*, **2**, 914.
- Le Roux, R. C. and Smith, L. S. (1964): *J. Forensic Med.*, **11**, 131.