

Prevalence of Alcohol and Drug Abuse in Schizophrenic Inpatients

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Summary. All schizophrenic patients admitted consecutively either to the Psychiatric Hospital of the University of Munich (group 1, $N = 183$) or the Mental State Hospital Haar/Munich (group 2, $N = 447$) between 1.8.1989 and 1.2.1990 were examined to assess prevalence estimates for substance abuse in schizophrenic inpatients. Psychiatric diagnosis were made according to ICD-9 criteria. Psychopathology and psychosocial variables were documented by means of the AMDP-protocol on admission and discharge. The diagnostic procedure included a detailed semi-structured interview concerning the individual alcohol and drug history and sociodemographic data, the Munich Alcoholism Screening Test (MALT), a physical examination and the screening of various laboratory parameters such as GGT and MCV, among others.

The results show that substance abuse is a very common problem in schizophrenics. Lifetime prevalence rates for substance abuse were estimated at 21.8% in group 1 and 42.9% in group 2, 3-month prevalence rates for substance abuse were estimated at 21.3% resp. 29.0%. Alcohol abuse was by far the most common type of abuse with prevalence estimates being 17.4% resp. 34.6%. Prevalence rates for substance abuse were much higher in the more "chronic" sample of the Mental State Hospital and in male patients. With respect to schizophrenic subtype few differences could be demonstrated with drug dependence being more common in patients with paranoid schizophrenia. The MALT proved to be a valuable screening instrument for alcohol abuse in schizophrenics with both a high specificity and sensitivity. "Dual diagnosis" schizophrenics had a significantly higher rate of suicide attempts and were less likely to be married. Possible clinical implications of these findings are discussed.

Key words: Schizophrenia – Alcoholism – Substance abuse

order such as depression, personality and anxiety disorder (Hesselbrock et al. 1985; Hirschfeld et al. 1989; Hasin et al. 1989; Roy et al. 1991a,b; Schuckit 1986a, b). A possible correlation between substance abuse and schizophrenia has long been suspected. In his 1975 review Freed reported prevalence rates for alcohol abuse in schizophrenia ranging from 3 to 63%. More recently, several authors (Alterman et al. 1980–1982; Test et al. 1985, 1989; Mueser et al. 1990) further emphasized this issue and reported a high comorbidity of alcohol or drug abuse and schizophrenia. Open questions concerning this topic have been addressed by Kesselmann et al. (1982) and Pulver et al. (1989) who pointed at the lack of valid epidemiological and clinical data on the prevalence of alcohol and drug abuse in schizophrenia, the temporal relationship between the onset of schizophrenia and an additional abuse as well as the specific psychopathology in "dual diagnosis" patients. Both clinical and epidemiological studies suggest that drug, especially cannabis, as well as alcohol abuse might be a risk factor for developing psychosis (Knudsen and Villmar 1984, Tsuang et al. 1982, Tien and Anthony 1990, Eikmeier et al. 1991). In previous studies, the lifetime prevalence of alcohol abuse/dependence in schizophrenia was estimated at 12.3% (Alterman et al. 1981), 14.2% (McLellan and Druley 1977), 14.8% (Drake et al. 1989 for alcohol dependence), 23.0% (O'Farrell et al. 1983) up to 42.8% (Barbee et al. 1989, alcohol dependence in male schizophrenics). Bernadt and Murray (1986) reported a prevalence for alcoholism in schizophrenics of 8.8% in the year preceeding survey and 6.3% for schizoaffective psychosis. Drake et al. (1990) found a lifetime diagnosis of an "alcohol use disorder" of 50.3% in schizophrenic outpatients. In a recent study, Mueser et al. (1990) reported a prevalence rate for alcohol abuse of 33.0% and a lifetime prevalence of 47.0%.

A possible relationship between substance abuse and psychosis can be considered in different ways:

1. Alcohol or drug abuse could cause a schizophrenia-like psychosis. For example McLellan et al. (1979) reported a higher prevalence rate for psychosis among amphetamine users when compared with barbiturate users. Andreasen et al. (1987) reported a six-fold rate of

Many clinical and epidemiological studies prove that alcoholics often suffer from an additional psychiatric dis-

a schizophrenic psychosis among Swedish cannabis users as opposed to non-users.

2. A preexisting psychosis may predispose to an additional alcohol or drug abuse by which the psychiatric disorder can be masked (Bagley and Binitie 1970) leading to serious problems in differential diagnosis. Some authors suggested the "self-medication hypothesis" as an explanation for substance abuse in affective disorder and schizophrenia.

3. Substance abuse in schizophrenic patients can cause additional psychiatric symptoms such as anxiety, delusional and hallucinatory symptoms and influence course of illness.

4. Treatment-relevant variables such as social integration and compliance could be significantly impaired by an additional alcohol or drug abuse in schizophrenic patients (Miller and Tanenbaum 1989; Kofoed et al. 1986; Drake and Wallach 1988). This is supported by the finding that among city shelters, patients with substance abuse and psychotic patients predominate (Priest et al. 1985; Susser et al. 1989).

These findings together with the obvious lack of valid data on the co-morbidity of alcohol/substance abuse and schizophrenia were reasons for us to perform a prospective study on the prevalence of alcohol and drug abuse in schizophrenic inpatients as well as on the psychopathology, psychosocial integration and other sociodemographic variables in "dual diagnosis" patients. This article will focus on the prevalence of alcohol/drug abuse in schizophrenia and possible clinical implications.

Methods

All psychiatric inpatients admitted consecutively either to the Psychiatric Hospital of the University of Munich or the Mental State Hospital Haar between 1. August 1989 and 1. February 1990 were included in the study. During that period 183 patients with a schizophrenic psychosis were admitted to the former (= group 1) and 447 schizophrenic patients to the latter (= group 2). The psychiatric diagnoses were made according to ICD-9 criteria; psychopathology and sociodemographic data were assessed by means of the AMDP protocol (Guy and Ban 1982) on admission and discharge. In addition, the alcohol and drug abuse was assessed by means of a detailed semi-structured interview concerning all relevant variables such as the individual drinking history, past psychiatric admissions and somatic as well as psychosocial variables possibly affected by either alcohol or drug abuse. Details of the diagnostic instruments and statistical analyses have been described elsewhere (Soyka et al. 1992). Furthermore, the "Munich Alcoholism Test", a diagnostic instrument with both high reliability and validity for alcoholism (Auerbach and Mechertsen 1981, Gorenc et al. 1984, Feuerlein et al. 1977) was performed for each patient. The diagnostic process included a somatic and neurological examination and the screening of various laboratory parameters such as GGT, GOT, GPT and MCV on admission.

Results

Patient characteristics are given in Table 1. Group 2, the sample derived from the Mental State Hospital, rep-

Table 1. Patient characteristics

	Group 1 N	Group 2 N
Number of patients	183	447
Male/female ratio	70/113	237/210
Paranoid subtype	56 (30.6%)	196 (43.8%)
Male/female ratio	19/ 37	117/ 79
Schizoaffective	55 (30.0%)	112 (25.1%)
Male/female ratio	19/ 36	39/ 73
Residual type	27 (14.7%)	75 (16.8%)
Male/female ratio	9/ 18	34/ 41
Mean age (years)	36.1 (18–73)	38.9 (17–78)
Males	32.2 (19–73)	37.2 (17–78)
Females	38.5 (18–71)	40.9 (19–73)
Duration of psychosis (years)	7.3 (1–36)	11.2 (1–50)
No. psychiatric admissions	4.2 (1–16)	5.9 (1–40)
Sociodemographic characteristics		
Married	48 (25.3%)	76 (17.0%)
Employed	128 (69.9%)	212 (47.4%)
Housewife	24 (13.1%)	46 (10.2%)
Unemployed/retired/other	31 (16.9%)	189 (42.2%)

resented a more "chronic" patient group with a higher rate of past psychiatric admissions, among others, and was therefore analysed separately from group 1, the sample derived from the psychiatric hospital at the University of Munich.

Prevalence Rates

The prevalence rates for any kind of addiction and abuse of or dependence on legal or illegal drugs were estimated as lifetime and 3-month prevalence. As demonstrated in Table 2 and 3, prevalence rates in group 2 were much higher than in group 1 with alcohol abuse or dependence being by far the most common kind of addiction. Alcohol and drug abuse were significantly more common in male than in female patients in both groups. The lifetime prevalence rate for any kind of addiction (abuse or dependence) was 21.8% in group 2 and 42.9% in group 1, the prevalence rate for females was 15.0% resp. 31.4%. The lifetime and three-month-prevalence rates for any kind of dependence were much lower.

When comparing the estimated prevalence rates in both groups the higher percentage of male patients in group 2 must be taken into consideration. Looking only at the male subgroup in both groups, the 3-month prevalence rates for alcohol abuse were both 30%.

The "Munich Alcoholism Test" identified 81.2% resp. 90.3% of the schizophrenics with alcohol abuse/dependence correctly. False positive results were very rare (Table 4).

Abuse Pattern

The prevalence rates in group 1 being very low, the abuse pattern of schizophrenic patients only of group 2 is given in detail. Apart from ethanol, cannabis, cocaine and amphetamines were the most commonly abused il-

Table 2. Prevalence of alcohol and drug abuse/dependence in schizophrenic inpatients – Results of Group I

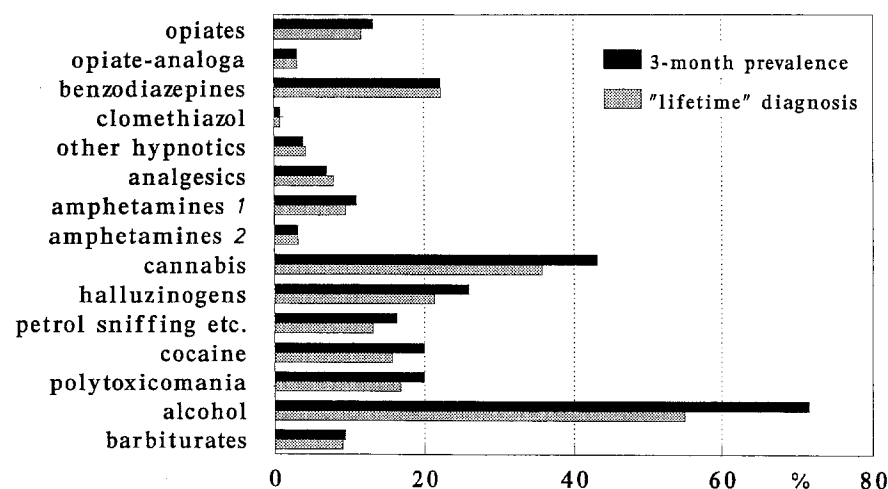
Diagnoses	Total		Male		Female		Significance <i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	<i>N</i>	(%)	
Total	183	100	70	100	113	100	
Any abuse/dependence							
Lifetime	40	21.8	23	32.8	17	15.0	<0.01
3-Month	39	21.3	22	31.4	17	15.0	<0.01
Dependence only							
Lifetime	13	7.1	8	11.4	5	4.4	ns
3-Month	12	6.5	7	10.0	5	4.4	ns
Alcohol abuse/dependence							
Lifetime	32	17.4	21	30.0	11	9.7	<0.001
3-Month	32	17.4	21	30.0	11	9.7	<0.001
-dependence only							
Lifetime	9	4.9	5	7.1	4	3.5	ns
Now	9	4.9	5	7.1	4	3.5	ns
Abuse/dependence of legal drugs							
Lifetime	11	6.0	5	7.1	6	5.3	ns
3-Month	10	5.5	4	5.7	6	5.3	ns
-dependence only							
Lifetime	4	2.1	3	4.2	1	0.9	ns
3-Month	3	1.6	2	2.8	1	0.9	ns
Abuse/dependence of illegal drugs							
Lifetime	10	5.5	6	7.1	5	4.4	ns
3-Month	10	5.5	5	7.1	5	4.4	ns
-dependence only							
Lifetime	2	1.1	2	2.8	0	–	ns
3-Month	2	1.1	2	2.8	0	–	ns

Table 3. Prevalence of alcohol and drug abuse/dependence in schizophrenic inpatients – Results of Group II

Diagnoses	Total		Male		Female		Significance <i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	<i>N</i>	(%)	
Total	447	100	237	100	210	100	
Any abuse/dependence							
Lifetime	192	42.9	126	53.1	66	31.4	<0.001
3-Month	130	29.0	96	40.5	34	16.2	<0.001
Dependence only							
Lifetime	96	21.5	64	27.0	32	15.2	<0.01
3-Month	59	13.2	46	19.4	13	6.1	<0.001
Alcohol abuse/dependence							
Lifetime	155	34.6	109	46.0	46	21.9	<0.001
3-Month	93	20.8	71	30.0	22	10.5	<0.001
-dependence only							
Lifetime	60	13.4	42	17.7	18	8.6	<0.01
3-Month	34	7.6	27	11.4	7	3.3	<0.01
Abuse/dependence of legal drugs							
Lifetime	66	14.7	33	13.9	33	15.7	ns
3-Month	39	8.7	24	10.1	15	7.1	ns
-dependence only							
Lifetime	29	6.4	14	5.9	15	7.1	ns
3-Month	13	2.9	7	3.0	6	2.9	ns
Abuse/dependence of illegal drugs							
Lifetime	64	14.3	51	21.5	13	6.2	<0.001
3-Month	51	11.4	44	18.6	7	3.3	<0.001
-dependence only							
Lifetime	30	6.7	25	10.5	5	2.4	<0.001
3-Month	23	5.1	21	8.9	2	1.0	<0.001

Table 4. Results of the "Munich Alcoholism Test"

	Group I		Group II	
	N	(%)	N	(%)
Total N	183	100	447	100
Patients with score 11 or more points	23	12.5	108	24.2
“False positive” results (score ≥ 11 points)	2	1.1	5	1.1
Patients with alcohol abuse/dependence (lifetime diagnosis)	32	100	155	100
Score ≥ 11 points	21	65.6	103	66.5
Patients with alcohol abuse/dependence (3-month-prevalence)	32	17.4	93	20.8
Score ≥ 6 und < 11 points	5	15.6	15	16.1
Score ≥ 11 points	21	65.6	69	74.2
Score ≥ 6 points	26	81.2	84	90.3
Average score in patients with alcohol abuse/dependence	19.30 (± 10.65)		15.40 (± 8.03)	
Munich Alcoholism Test: Score ≥ 11 points confirming alcoholism, score ≥ 6 < 11 points suggesting alcoholism				

**Fig. 1.** Abuse pattern in "dual diagnosis" schizophrenics (results of group 2).
1 stimulant, 2 weight reducer

legal drugs (see Fig. 1). The number of patients taking hallucinogenes was surprisingly high. Among legal substances, benzodiazepines were by far the most commonly abused drug. While 89 of the 155 patients with a lifetime history of alcoholism had no history of an additional drug abuse, an isolated drug abuse was rarely found (Fig. 2). None of the patients abused antiparkinsonian medication.

Prevalence Rates in Schizophrenic Subgroups

In both groups of schizophrenic patients the paranoid subtype was the most common schizophrenic psychosis, followed by schizoaffective and residual type (Table 1). While for the schizophrenic patients in group 1 no statistically significant differences could be demonstrated, schizophrenic patients with paranoid subtype from the larger group 2 did have a significantly higher lifetime (9.6% vs. 4.3%, $P < 0.05$, Table 5) and 3-month (8.2% vs 2.7%, $P < 0.01$) prevalence rate for drug dependence and a higher 3-month prevalence for any kind of dependence (16.6% vs 10.8%, $P = 0.08$) than the other schizo-

phrenics in this group, whereas no significant differences could be demonstrated for the variables such as alcohol abuse as listed in detail in Tables 2–4. Patients with schizoaffective psychosis did not differ significantly from other schizophrenics. Patients with chronic (residual) type schizophrenia had the highest lifetime prevalence rates for any kind of abuse/dependence (54.7% vs. 40.6%, $P < 0.05$) in comparison with non-residual schizophrenics.

Order of Onset of Psychosis and Addiction

Firstly, a drug abuse was found nearly exclusively in schizophrenics younger than 30 years. All 11 patients with drug abuse in group 1 and 43 of the 64 patients in group 2 were younger than 30 years.

Secondly, a detailed analysis of the data of the larger group 2 showed that the onset of addiction in general was later than the onset of a psychosis, especially in female patients (Table 6). An additional substance abuse more often followed than preceded onset of psychosis. The onset of psychosis had to be defined retrospectively and was estimated at the first time positive or negative

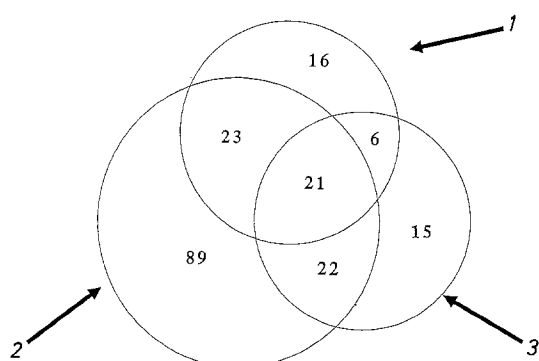


Fig. 2. Comorbidity of alcohol and substance abuse lifetime diagnoses in 192 schizophrenic inpatients (group 2); 1 abuse of legal drugs ($n = 66$); 2 alcohol abuse ($n = 155$); 3 abuse of illegal drugs ($n = 64$)

Table 5. Differences in prevalence rates for alcohol/substance abuse among schizophrenic subtypes (results of Group 2)

	Paranoid subtype		Other schizophrenics		<i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	
	196	100	251	100	
Any kind of addiction					
Lifetime diagnosis	32	16.3	27	10.8	0.08
Drug addiction					
Lifetime diagnosis	19	9.6	11	4.3	<0.05
3-Month prevalence	16	8.2	7	2.7	<0.01
	Residual type		Other schizophrenics		
	75	100	372	100	
Any kind of abuse					
Lifetime diagnosis	41	54.7	151	40.6	<0.05

Table 6. Age at onset of psychosis, duration of illness and number of psychiatric admissions in schizophrenics with and without the diagnosis of an alcohol/drug abuse (results of group 2)

	Schizophrenics		<i>P</i>
	With abuse <i>N</i>	Without abuse <i>N</i>	
Age at onset of psychosis (years) in patients with			
– Any kind of abuse (lifetime)	27.1 (± 10.4)	28.4 (± 9.9)	
– With alcohol abuse ($N = 155$)	27.4 (± 10.3)		
– Any kind of abuse (3-Month-prevalence, $N = 130$)	27.3 (± 10.9)		
Alcohol abuse ($N = 93$)	28.0 (± 10.8)		
Illegal drugs ($N = 51$)	20.8 (± 4.8)		
Duration of illness (years)	10.8 (± 9.5)	11.4 (± 9.9)	
Age at examination (years)	37.9 (± 11.5)	39.8 (± 13.2)	
Age at begin of abuse (years)	29.7 (± 10.7)		
– Alcohol abuse	30.3 (± 10.3)		
– Illegal drugs	22.0 (± 4.6)		
Duration of abuse at examination (years)			
– All patients	8.3 (± 6.9)		
– Alcohol abuse	8.9 (± 7.6)		
– Drug abuse	5.9 (± 3.4)		
No. of psychiatric admissions	5.79 (± 6.1)	4.60 (± 5.7)	<0.05

symptoms were reported. Since many patients had been admitted repeatedly to psychiatric hospitals the past psychiatric history could be assessed quite accurately. With respect to alcohol abuse (155 patients) in 85 (54.8%) of the cases psychosis preceded, in 62 (40.0%) followed, the onset of alcohol/drug abuse, in 8 (5.2%) patients both disorders had a simultaneous onset. In patients with onset of psychosis prior to begin of alcohol abuse (mean age 38.5 ± 11.5 years) onset of psychosis had been 14.8 (± 10.2) years, onset of abuse 4.9 (± 4.5) years before examination. In patients with alcohol abuse prior to onset of psychosis (mean age 38.2 ± 10.9 years), onset of abuse had been 11.9 (± 8.2) years, onset of psychosis 5.3 (± 5.6) years before examination.

Interestingly, 36% of the 74 patients with first manifestation of schizophrenic psychosis fulfilled the criteria for lifetime diagnosis of an additional alcohol/drug abuse, the 3-month prevalence rate was 31%. Alcohol abuse/dependence (23%) was more common than abuse of illegal (13%) or legal drugs (13%).

Sociodemographic Parameters

When compared with patients without addiction (Tables 7 and 8), both the numbers of married individuals and descended children were found to be markedly smaller among schizophrenics with an additional alcohol/drug abuse. Also, patients with a history of alcohol/drug abuse had made significantly more suicide attempts than those without (Table 9) and had been homeless significantly more often in the past.

Discussion

The results of the study suggest a high prevalence rate for alcohol and drug abuse among schizophrenic patients.

Table 7. Sociodemographic parameters in schizophrenic inpatients of Group II with and without addiction (3-month-prevalence)

Schizophrenics	With addiction		Without addiction		Significance <i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	
	130	100	317 ^a	100	
<i>Marital status</i>					
Single	86	66.2	176	57.0	ns
Married yet	10	7.7	66	21.4	<0.001
Divorced	25	19.2	50	16.2	ns
Separated	4	3.1	4	1.3	ns
Widowed	5	3.8	13	4.2	ns
<i>Number of children</i>					
None	95	73.1	199	63.0	<0.05
One	16	12.3	65	20.6	<0.05
Two	11	8.5	29	9.2	ns
More than two	8	6.1	24	7.2	ns
<i>Homelessness</i>					
Prior	54	41.5	68	21.4	<0.05
On admission	17	13.1	28	8.8	ns

^a In this subgroup no valid data available in 8 patients. Statistics and level of significance only given for patients with complete data

Table 8. Sociodemographic parameters in schizophrenic patients of Group II with and without "lifetime" diagnosis of addiction

Schizophrenics	With addiction		Without addiction		Significance <i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	
	192	100	255 ^a	100	
<i>Marital status</i>					
Single	126	65.6	136	55.1	<0.05
Married	18	9.4	58	23.5	<0.001
Divorced	36	18.8	39	15.8	ns
Separated	5	2.6	3	1.2	ns
Widowed	7	3.6	11	4.5	ns
<i>Number of children</i>					
None	134	69.8	160	62.7	ns
One	32	16.7	49	19.2	ns
Two	16	8.3	24	9.4	ns
More than two	10	5.2	22	8.7	ns
<i>Homelessness</i>					
Prior	72	37.5	50	19.5	<0.01
At admission	22	11.5	23	9.0	ns

^a In 8 cases incomplete data available

The 3-month and lifetime prevalence rates for any kind of abuse/dependence were significantly higher in the group of schizophrenic patients examined at a mental state hospital than in the group of patients examined at an university hospital and significantly higher among male patients.

Unlike some studies in the USA, alcohol was by far the most commonly abused drug. Cannabis, amphetamines and cocaine were the most frequently abused illegal drugs, followed by opioids and hallucinogens. Concerning legal drugs the number of patients abusing benzodiazepines was surprisingly high.

Several methodological difficulties are encountered in assessing alcohol/drug abuse in schizophrenic patients. Thus, a matter of concern has been psychiatric diagnosis which in the present study was made according to ICD-9 criteria. Since most patients had been treated in psychiatric hospitals a number of times, reliable informations on the past psychiatric history was available. Psychopathology was documented by means of the AMDP system. An obvious problem was to find a consensus on the patients' alcohol and drug history. Apart from records of prior psychiatric admissions and the patients' self-reports a detailed semistructured interview was performed on each patient to collect any possible information on the patient's alcohol/drug history. We feel that this was an adequate procedure to ensure psychiatric diagnosis. From a methodological point of view it seems noteworthy that the "MALT" correctly identified 81.2% of the 90.3% patients clinically diagnosed as alcoholics, with false positive results being very rare, and therefore proved to be a valuable diagnostic instrument for assessing alcohol abuse in schizophrenic patients. Only two pilot studies have addressed the problem of validity of alcoholism screening instruments in schizophrenics so far (Smith and Pistrach 1990; Toland and Moss 1989). In comparison with the results reported in these studies the "MALT" proved to be a valuable diagnostic instrument of good sensitivity and remarkably high specificity in schizophrenic patients.

Another important issue is the order of onset of psychosis and addiction, which has been a source of speculation. In our own sample the onset of psychosis more often preceeded than followed onset of an alcohol/drug abuse which again was the case in about a third of the "dual diagnosis" patients. Since both alcoholism and drug abuse can result in chronic schizophrenia-like psychosis in some cases (Benedetti 1952; Glass 1989a, b; Bron 1982) it may be argued whether some of the patients

Table 9. Suicide attempts in schizophrenic patients

Schizophrenics	Without addiction		With addiction		<i>P</i>
	<i>N</i>	(%)	<i>N</i>	(%)	
<i>Group I</i>	143		40		
Patients with suicide attempts	19	(13.2)	12	(30)	<0.05
<i>Group II</i>	255		192		
Patients with suicide attempts	95	(37.3)	96	(50)	<0.01
Number of suicide attempts/patients	0.76	(±1.56)	1.34	(±2.25)	<0.01

diagnosed as being schizophrenic indeed suffer from a schizophrenia-like psychosis caused or induced by alcohol/drug abuse. Since valid biological or genetic markers for the diagnosis of schizophrenia have not yet been established and the psychopathology in chronic alcohol hallucinosis closely resembles chronic schizophrenia (Benedetti 1952) this possibility cannot be ruled out completely. Yet clinical and psychopathological studies have shown that some psychopathological symptoms such as psychotic ego disturbances and schizophrenic thought disorder, both being rarely found in alcohol psychosis, as well as age at onset and different family history, among others, can facilitate differential diagnosis between both conditions (Soyka 1989, 1990). Some other findings appear to count against this hypothesis, too. With respect to alcohol hallucinosis, catamnestic studies have shown that only in a minority of cases does a chronic schizophrenia-like psychosis finally emerge (review by Glass 1989b). Thus chronic alcohol hallucinosis which might be mistaken for schizophrenia can be considered a very rare phenomenon. Since alcohol hallucinosis resembles paranoid schizophrenia, most of all but patients with paranoid schizophrenia did not show higher prevalence rates for alcohol abuse/dependence than other schizophrenics in our study, there is little reason to assume that patients diagnosed as schizophrenics really had alcohol hallucinosis in disguise. Other findings further corroborate this view: alcoholics usually develop alcohol hallucinosis in their late thirties following a long-time alcoholism and therefore later in life than (paranoid) schizophrenia on average (Soyka and Zugs 1989) which was not the case in the schizophrenic patients with alcohol abuse in our sample.

As for drug abuse the setting is equally complex. A major psychopathological feature, the paranoid-hallucinatory symptomatology in drug (such as cocaine-induced) psychosis differs from equivalents in schizophrenia (Unnithan and Cutting 1992) but there is little doubt that some drugs, especially amphetamines and hallucinogens, but also cannabis, can cause acute schizophrenia-like psychosis. Still, there is very limited evidence that drug abuse can result in a chronic psychosis. Drug abusers with schizophreniform psychosis were found to develop psychosis at an earlier age than schizophrenics in general (Alterman et al. 1984; Breakey et al. 1974; Erard et al. 1980; Richardson et al. 1985) which was also the case in our material. Tsuang et al. (1982) found a significantly higher rate of schizophrenia in the families of patients with prolonged drug-induced psychosis, i.e. with a minimum duration of 6 months. Bron (1982) and McGuire (1992) reported similar results. Other authors have reported a high rate of affective disorders in families of patients with drug-induced psychosis (Bowers 1977; Horowitz 1975; Pope 1979). A catamnestic study of the patients examined by Tsuang et al. (1982) showed that patients with an initially chronic course and severe psychotic symptoms had a poorer outcome than those with an initially faster remission (Perkins et al. 1986) and Vardy and Kay (1983) reported high rates for alcohol and especially drug abuse in families of dual diagnosis schizophrenics but the methodology of both studies has

attracted considerable concern (Kane and Selzer 1991). Thus there is some evidence that chronic cannabis and drug abuse can result in a chronic schizophrenia-type psychosis but the question remains unanswered whether these patients might have developed schizophrenia in any possible case, regardless of drug abuse. Tsuang estimated that some 60000 drug users would have to be canvassed in a follow-up study to answer that question.

Up to date, few studies have focused on the order of onset of alcohol/drug abuse and schizophrenia (Pulver et al. 1989). Hays and Aidroos (1986) reported cases in which alcoholism clearly antedated the onset of schizophrenic psychosis. Werner et al. (1981) mentioned a group of 45 alcoholics with "schizophrenic syndromes". Of these, in 33 cases alcoholism preceded the onset of psychosis. Bland et al. (1987) reported cases in which alcohol/drug abuse both preceded and followed the onset of schizophrenia.

The most important findings in our study have been the high prevalence rates for alcohol/drug abuse and dependence in both groups of schizophrenic patients. Most previous studies on this topic suffered from serious methodological problems concerning sample size, representivity of the sample and diagnostic instruments (for review see Mueser et al. 1990). The prevalence rates for alcohol/drug abuse found in our study were considerably higher than those reported for the general population. Epidemiological field studies in the Upper Bavarian region suggested a prevalence rate for alcoholism of 7.9% (Fichter 1990), the US "Epidemiological catchment area" study (Regier et al. 1988) a 6-month prevalence rate for alcohol abuse/dependence of 4.7% in general and 9% for males. The "lifetime" prevalence was reported to be 13.3%. The latter study also showed a high co-morbidity of alcoholism and schizophrenia: among alcoholics, schizophrenia was four times more common than among non-alcoholics (Helzer and Pryzbeck 1988), the co-morbidity of alcoholism and affective disorder being comparatively rare. Prevalence estimates for substance abuse among patients with schizophrenia were estimated at 47.0% and 33.7% for alcohol abuse resp. alcohol-related disorders (Regier et al. 1990), thus showing similar results to our study. In another epidemiological study Bland et al. (1987) reported a "lifetime" prevalence of alcohol abuse of 61.2% and for drug abuse of 50.8% in schizophrenics but the number of schizophrenic patients was small. Likewise, our data on the prevalence of alcohol and drug abuse among schizophrenics support the hypothesis that schizophrenia is associated with a higher rate of alcohol and drug abuse. Whether the increasing prevalence estimates for substance abuse in recent surveys indicate a real increase in alcohol/drug abuse in schizophrenics as suggested by Cuffel (1992) or should rather be attributed to improved methods of assessing or differences in defining substance abuse or instead merely reflect differences in study samples is debated (Alterman 1992, Siris 1992).

As the results of other studies have already indicated, there seems to be a quite distinct abuse pattern in schizophrenia. Apart from alcohol, the most frequently abused drugs in the study of Mueser et al. (1990) were cannabis

(42%), psychostimulants (25%) and hallucinogens (18%), while narcotics (4%) and sedatives (7%) were abused only infrequently. In other predominantly US studies the proportion of cannabis abusers among schizophrenic patients was estimated at 35% (Barbee et al. 1989), 45% (Breakey et al. 1974) up to 65.8% (Negrete et al. 1986). Prevalence rates for psychostimulants and cocaine abuse were reported to be 4.5% (Hansell and Willis 1977), 11.3% (Barbee et al. 1989), 13.0% (Siris et al. 1988), 15.0% (Breakey et al. 1974) up to 23.1% (Richard et al. 1985), while hallucinogens were reported to be consumed by 5.7% (Barbee et al. 1989), 9.9% (McLellan and Druly 1977), 11% (Siris et al. 1988) or up to 20% (Breakey et al. 1974). These data must be seen in comparison with drug exposure and abuse pattern in the general population. While alcohol abuse is very frequent in Germany with the per-capita consumption of alcohol being approximately 11L in 1989, most experts agree that drug abuse still is a more severe problem in the US. In Germany, until recently, the abuse of narcotics was much more prominent than the abuse of psychostimulants and cocaine (Leune 1991).

With respect to schizophrenic subtypes few differences could be demonstrated. Patients with paranoid schizophrenia had a higher 3-month (8.2% vs. 2.7%, $P < 0.01$) and lifetime (9.6% vs. 4.3%, $P < 0.05$) prevalence for drug abuse. These results are well in line with other findings (Bernadt and Murray 1986; Mueser et al. 1990). The highest overall prevalence rates for any kind of abuse were found among patients with residual type. This could suggest that an additional alcohol/drug abuse might either indicate a more chronic course of illness or reflect less social support and an inadequate psychosocial integration, as indicated by a large number of unmarried patients in our study. As mentioned before, several studies have shown a frequent association of both alcoholism and schizophrenia with homelessness (Priest et al. 1985; Susser et al. 1985, 1989). Social status, race and educational level have been considered to be of some importance for the development of alcohol/drug abuse in schizophrenics (Mueser et al. 1990) but apart from sex neither educational nor social background nor marital status were found to be predictive in any way (Pulver et al. 1989; Zeiler 1990, 1991). Probably alcohol/drug abuse significantly accentuates non-compliance in schizophrenics (Alterman et al. 1980; Drake and Wallach 1988; Drake et al. 1989; Miller and Tanenbaum 1989; Wallen and Weiner 1989) and contributes to a disappointing outcome and poor social integration.

A third possible explanation for the high prevalence rates for alcohol/drug abuse in schizophrenia and the different abuse patterns related to various schizophrenic subtypes is offered by the "self-medication"-hypothesis. It has been suggested that certain psychopathological symptoms such as post-psychotic depression, hallucinations or "negative" symptoms such as anhedonia or anergia might predispose to a particular abuse pattern (Pope 1979; Schneier and Siris 1987; Zeiler 1990, 1991). For example cocaine or psychostimulants might be self-administered in an effort to treat predominantly "negative" symptoms whereas patients with anxiety might be more susceptible to alcohol or sedatives.

There is some dissent in the literature on the psychopathology of "dual diagnosis" schizophrenics: While most authors found either more "positive" (Hays and Aidroos 1986; Drake et al. 1989; Pulver et al. 1989) or less "negative" symptoms in dual diagnosis patients than in other schizophrenics (Peralta and Cuesta 1992) or no differences at all (Mueser et al. 1990), Dixon et al. (1991) in their recent study found less negative and paranoid symptoms in dual diagnosis schizophrenics at discharge and speculated over a better prognosis and outcome in these patients. This cannot be confirmed, however, and requires further research. At present there is little information on the long-term outcome of dual-diagnosis schizophrenics although some studies have suggested a higher relapse rate in dual diagnosis schizophrenics as indicated by a higher number of rehospitalizations, discharges against advice or less frequent contacts by ambulant services (Crowley et al. 1974; Richardson et al. 1985; Miller and Tanenbaum 1989; Safer 1987; Solomon 1986; Solomon and Davis 1986; Zeiler 1990).

Apart from psychopathological and social variables the role of psychopharmacology both as a risk factor for alcohol/drug abuse and its therapy in schizophrenia has yet to be elucidated. Siris (1990) in his excellent review on this topic raised the question whether side effects of neuroleptic treatment such as akinesia or depressive symptoms might predispose to secondary drug abuse, especially of cocaine and amphetamines, which are both dopaminagonist drugs and effective in akinesia. This might explain the apparently high rate of psychostimulant abusers among schizophrenic patients. In this case adequate antiparkinsonian medication would represent a prophylaxis against the development of a secondary abuse. Interestingly, although antiparkinsonian medication with anticholinergic properties is known to have an abuse potential, none of the patients in our study abused biperiden or other antiparkinsonian drugs.

Another major finding of our study has been the significantly higher rate of suicide attempts in patients with a history of alcohol/drug abuse. In catamnestic studies figures for completed suicides of schizophrenics range from 4.3% (Huber et al. 1979), 4.5% (Bleuler 1972), 5% (Eggers 1974) up to 10% (Carone et al. 1991) and for suicide attempts from 13.8% (Jantz 1951) up to 41.2% (Huber et al. 1979). Suicides account for about 10% of deaths in schizophrenics (Häfner 1991). Suicidal actions are most common especially at onset of illness (Gruhle 1940; Huber et al. 1979) and among severely psychotic patients (Eggers 1974). In addition the importance of alcohol and substance abuse for suicide in general has also long been established (Berglund 1984; Roy and Linnoila 1986; Murphy et al. 1979) although the lifetime risk in alcoholics of dying from suicide has been estimated to be only 2–2.2% (Murphy and Wetzel 1990). An additional psychiatric disorder in alcoholics probably heightens the risk of committing suicide considerably (Murphy and Wetzel 1990). The results of our own study further emphasize the important role of an additional alcohol/drug abuse for suicidal actions in schizophrenics as suspected by Kesselman et al. (1982) and Allebeck et al. (1987).

In summary, from our own and the reported data we conclude that alcohol and drug abuse are common conditions in schizophrenia and can be described by the following abuse pattern: apart from alcohol and cannabis, also the most widely abused drugs in the general population, schizophrenics tend to consume psychostimulants/cocaine more often than other drugs, such as narcotics. This might be explained by the special psychopathology of dual diagnosis schizophrenics with a strong focus on "positive" or „negative" symptoms leading to "self medication" attempts, psychosocial and genetic factors as well as family background or simply the availability of certain drugs or alcohol for the patient. An additional alcohol/drug abuse seems to have a major impact on the course of illness as indicated by the number of hospitalizations, suicide attempts and psychosocial integration, among others. The psychopathology of schizophrenic patients with an additional addiction still remains a challenge and the further analysis of our data may show differences between schizophrenics with and without alcohol/drug abuse. Catamnestic studies both on schizophrenics and alcohol/drug abusers as well as epidemiological studies are necessary to elucidate further the role of the order of onset of both disorders in dual diagnosis patients. Finally, because of the dichotomy of psychiatric care and treatment facilities for substance abuse there is an obvious lack of adequate therapeutic strategies regarding dual diagnosis patients, thus calling for new concepts and treatment studies (Kofoed et al. 1986; Minkoff 1989; Weiss and Mirin 1989; Ridgely et al. 1990).

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