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*Regular Article*

# Prevalence and identification of alcohol use disorders among severe mental illness inpatients in Taiwan

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*Aims:* A higher prevalence of alcohol use disorders (AUD) among psychiatric patients has been reported previously and the identification rate is relatively low. This study was designed to investigate the prevalence and identification of AUD among acute psychiatric inpatients with severe mental illness in a psychiatric hospital in Taiwan.

*Methods:* In a two-phase case identification strategy, the Alcohol Use Disorders Identification Test (AUDIT) was used as the first phase screening tool and the Structured Clinical Interview for DSM-IV-TR as the second phase diagnostic interview. The definition of identification was diagnosis of AUD on medical record at discharge.

*Results:* Of 400 respondents, 42 screened positive and 358 screened negative. All screen-positive respondents and 35 screen-negative respondents entered the second phase interview. The weighted lifetime prevalence of alcohol dependence was 8.3% (95% confidence interval [CI]: 4.6–11.9%); alcohol abuse, 1.5% (95%CI: 0.2–2.8%); and AUD, 9.8% (95%CI: 5.7–13.8%). The overall identification rate of AUD by medical staff was 28.2% (0% for alcohol abuse and 33.3% for alcohol dependence). Patients with mood disorders were prone to being undetected as having AUD.

*Conclusion:* AUD comorbidity was common among inpatients with severe mental illness in Taiwan and was easily neglected by medical staff. It is necessary to use a validated screening questionnaire, such as AUDIT, to detect high-risk patients and then give appropriate interventions to enhance treatment outcome.

**Key words:** alcohol use disorders, identification, prevalence, severe mental illness.

HIGH PREVALENCE OF substance use disorder among psychiatric patients is observed worldwide.[1–3] Comorbidity with substance use may destabilize patients with severe mental illness and greatly increase the likelihood of treatment noncompliance, rehospitalization, and aggression or suicide. Substance use can also be associated with overall health and physical comorbidities. All the patient's mental and physical problems increase the utilization of health-care services.[4] Except for nicotine, alcohol use disorder (AUD) is the most common substance use disorder among patients with schizophrenia or bipolar disorder.[4] Notably, patients with alcohol dependence have longer hospital stays than patients without alcohol dependence.[5]

Identification of severe mentally ill patients with AUD and application of appropriate intervention are important in clinical practise. The practise guidelines recommend that routine assessment of alcohol use problems should be integrated when caring for individuals with major mental disorders.[6] A low identification rate, however, of AUD was found in psychiatric settings[7–9] and may hinder

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adequate treatment planning and result in poor outcomes.[4]

Use of a brief and self-report screening questionnaire has been shown to be more sensitive than observational or laboratory data to detect patients with AUD in psychiatric settings.[10] Alcohol Use Disorders Identification Test (AUDIT), which was developed by the World Health Organization, has 10 items to assess alcohol consumption and its related consequences in the previous year.[11] Among the screening instruments for problem drinkers, the consistency regarding sensitivity of measures varied considerably across different ethnic and gender groups. But AUDIT has been shown to have consistently high sensitivity across subgroups[12] and is suggested as being feasible for clinical use in psychiatric settings.[13,14] At an AUDIT cut-off of ≥8, AUDIT had a high sensitivity of 87–90% and specificity of 70–90% in detecting alcohol use disorders in patients with severe mental illness.[13,14]

Lifetime prevalence of AUD has been reported from 34% to 60% among patients with schizophrenia[4] and 44% among patients with bipolar disorder[15] in Western countries. In Taiwan the prevalence of AUD ranged from 6.1% to 9.9% among patients with bipolar disorders.[9,16] There has been no study to investigate the prevalence of AUD in patients with severe mental illness, including schizophrenia, bipolar disorder, and major depressive disorder in Taiwan. In addition, although a low identification rate of AUD in non-psychiatric settings has been recognized,[17] the identification of the severe mentally illness comorbid with AUD in psychiatric settings remains to be investigated. The aim of the present study was therefore to estimate the prevalence of AUD among psychiatric inpatients with severe mental illnesses and to investigate the identification of such patients by psychiatric staff.

## METHODS

### Study design and subjects

The study was conducted in Taipei City Psychiatric Center (TCPC), a psychiatric hospital located in northern Taiwan, from November 2005 to October 2006, and was approved by the Institutional Review Board of TCPC. Participants were sampled from the consecutively admitted inpatients of two acute psychiatric wards. Patients were included if they (i) met DSM-IV-TR diagnosis criteria of schizophrenia, bipolar I disorder, major depressive disorder; and (ii) could understand the assessment and provide informed consent. Excluded were those who (i) had an indistinct Axis I diagnosis; (ii) stayed in the hospital for <1 week; (iii) refused to collaborate; (iv) were too psychiatrically ill to understand the goal of the study; or (v) were discharged before completing the interview. We explained to all subjects that the aim of the study was to investigate their health behaviors and patterns of alcohol use.

### Instruments and measures

We adopted the two-phase case finding method[18] to estimate the prevalence of AUD among psychiatric inpatients with severe mental illness. AUDIT was used as the first phase screening instrument and the Structured Clinical Interview for DSM-IV-TR (SCID) as a diagnostic interview at the second phase. Figure 1 shows the flow chart of this study process.

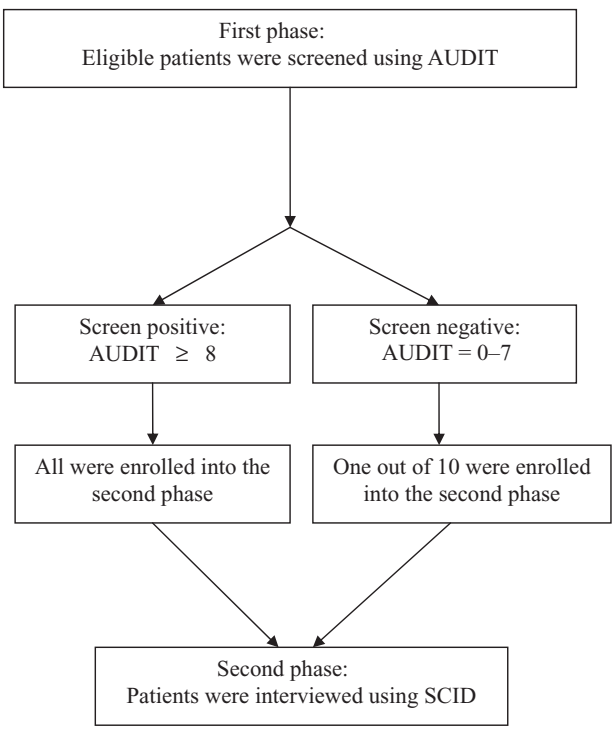


**Figure 1.** Flow chart of the two-phase case finding for alcohol use disorders among inpatients with severe mental illness in one psychiatric hospital in Taiwan. AUDIT, Alcohol Use Disorders Identification Test; SCID, Structured Clinical Interview for DSM-IV-TR.

AUDIT is composed of 10 questions (three on quantity–frequency, three on alcohol-related behaviors, and four on alcohol-related consequences or harm). Every AUDIT question is scored from 0 to 4 on the basis of respondent's drinking quantity and frequency of occurrence of alcohol-related problems. With the exception of the last two items, all other AUDIT items relate to the past 1 year. The last two items inquire about alcohol-related problems and have a higher weight of occurrence in the past year and a lower weight for occurrence ever. The first question on alcohol consumption history inquires whether the patient has 'ever' drunk. If the response is 'yes', the respondents were then asked the rest of the items. If the response is 'no', all the AUDIT items are assumed to be zero in score. The Chinese version of AUDIT and its validity has been well established.[17,19] The assessment materials were administered in an interview by four trained nurses using the language most comfortable for the patients to lessen the cognitive burden and thereby enhance the accuracy of reporting. We also collected information on patient age, employment status, marital status, education, living arrangement, and clinical psychiatric diagnosis. Patients with AUDIT scores ≥8 were defined as screen positive and AUDIT <8 as screen negative.

All screen-positive patients and one out of 10 screen-negative patients were enrolled in the second phase and were interviewed on the SCID by one senior psychiatrist (MCH or CHY) to provide the diagnosis of lifetime AUD.[20] The interviewers were blind to patient clinical diagnosis and screening status. We examined the interrater reliability of our diagnosis of AUD with SCID in a sample of 10 patients before recruiting them. The interrater reliability for the diagnosis of AUD was excellent, with a kappa of 1.0 between two interviewers (MCH and CHY).

Identification of AUD by medical staff was assessed by reviewing their medical records after patient discharge. The definition of identification was diagnosis of AUD on medical records at discharge.

### Statistical analysis

Descriptive statistics were used to show the characteristics of participants and the distribution of AUDIT scores. Because we used the two-phase design, weighted prevalence estimates and their 95% confidence intervals (CI) of AUD were calculated using the command (svymean) of Stata 7.0 (StataCorp, College Station, TX, USA). The sampling weights are defined as the inverse of the sampling rate.

We used Fisher's exact test to assess the associations between the identification status and various categorical correlates and used *t*-test to evaluate differences in numerical variables between the identified and the non-identified groups. The differences between the groups were considered significant for $P < 0.05$.

## RESULTS

### Sample description

Table 1 shows the demographic and clinical features of 400 recruited psychiatric inpatients. The AUDIT score ranged from 0 to 32, with a mean ± SD of 2.3 ± 5.0. Of the 400 patients, 313 had schizophrenia and 87 mood disorders (bipolar disorder, $n = 81$;

**Table 1.** Subject characteristics for 400 psychiatric inpatients

| | |
|---|---|
| Mean age ± SD (years) | 39.2 ± 10.1 |
| Gender, *n* (%) | |
| Female | 204 (51.0) |
| Male | 196 (49.0) |
| Marital status, *n* (%) | |
| Married | 86 (21.6) |
| Others[†,‡,§,¶] | 314 (78.4) |
| Education,[‡] *n* (%) | |
| >9 years | 254 (64.6) |
| ≤9 years | 139 (35.4) |
| Occupation, *n* (%) | |
| Unemployed | 314 (78.5) |
| Others[§] | 86 (21.5) |
| Living status, *n* (%) | |
| Living alone | 52 (13.0) |
| Others[¶] | 348 (87.0) |
| Diagnosis, *n* (%) | |
| Mood disorders[††] | 87 (21.7) |
| Schizophrenia | 313 (78.3) |
| AUDIT score, *n* (%) | |
| ≥8 | 42 (10.5) |
| <8 | 358 (89.5) |

[†]Including single, widows, and divorced, [‡]seven missing data, [§]including employed, students, housewife and retired persons, [¶]including living with family or in an institution, [††]Mood disorders include bipolar I disorder and major depressive disorder.
AUDIT, Alcohol Use Disorders Identification Test.

major depressive disorders, $n = 6$). The number of screen-positive patients was 42 (10.5%).

### Weighted lifetime prevalence of AUD

All screen-positive and 35 screen-negative respondents entered the second phase for the SCID assessment to provide lifetime DSM-IV-TR diagnoses of AUD. Distribution of demographic characteristics was not statistically different between screen-negative patients who did or did not enter the second phase. Mean AUDIT score, however, among screen-negative patients who entered the second phase interview ($0.4 \pm 0.9$) was significantly lower than that among screen-negative patients who did not enter the second phase ($2.5 \pm 5.2$; $P = 0.01$). Figure 2 shows the results of two-phase case finding and the weight prevalence of AUD. Because of the small number of patients with alcohol abuse, we combined alcohol dependence and alcohol abuse into AUD for the following analyses. The weighted lifetime prevalence of AUD was 9.8% (95%CI: 5.7–13.8%) in this total sample, 13.5% (95%CI: 6.5–20.5%) in male patients, and 5.4% (95%CI: 1.3–9.5%) in female patients. In terms of two major psychiatric disorders, the lifetime prevalence of AUD was 8.3% (4.5–12.2%) in patients with schizophrenia and 22.7% (0–46.1%) in patients with mood disorders.

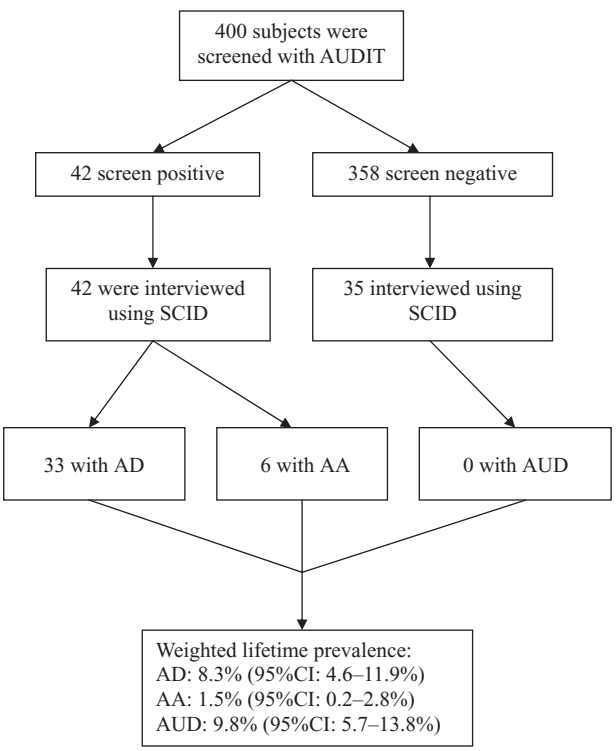


**Figure 2.** Results of the two-phase case finding for alcohol use disorders among inpatients with severe mental illness in one psychiatric hospital in Taiwan. AA, alcohol abuse; AD, alcohol dependence; AUD, alcohol use disorder; AUDIT, Alcohol Use Disorders Identification Test; SCID, Structured Clinical Interview for DSM-IV-TR.

### Identification of AUD

Among 39 patients who had AUD comorbidity, the overall identification rate of AUD by medical staff was 28.2% (0% for alcohol abuse and 33.3% for alcohol dependence). There were no differences in mean age ($41.1 \pm 7.5$ years vs $40.1 \pm 9.2$ years, $P = 0.70$) and mean AUDIT score ($17.3 \pm 6.5$ years vs $15.0 \pm 6.1$ years, $P = 0.31$) between patients who were identified and those who were not identified, respectively. Table 2 lists other demographic and clinical characteristics between the two groups. No demographic variable was associated with the identification status. Patients with mood disorders were prone to being undetected as having AUD ($P = 0.04$).

## DISCUSSION

The present study is the first to highlight the comorbidity of AUD in severe mentally ill inpatients in Taiwan. This study shows that the lifetime prevalence of AUD was 9.8%, lower than that found in some Western studies, which ranged from 29.8% to 47%.[21–23] Direct comparisons between studies using different methodology are not feasible. The rate of high-risk individuals with AUD, however, which was defined by an AUDIT score of ≥8, was 8% in one study of Indian psychiatric inpatients.[8] Similarly, in the present study 10.5% of the sample had the AUDIT score of ≥8. In the present study the lifetime prevalence of AUD among schizophrenia inpatients was 8.3%, which was lower than that in Western reports.[15,22] As to patients with mood disorders, the prevalence of AUD in the present study was 22.7%, also lower than that in Western samples (44%).[15] Apparently AUD comorbidity in patients with severe mental illness varies across different ethnic backgrounds. An investigation examining cross-national comparison found considerable variation in lifetime AUD in general populations.[24] AUD is believed to be a multifactorial disease. The reasons for such high

**Table 2.** Identification of alcohol use disorders by medical staff

| | Identified patients ($n = 11$) | Unidentified patients ($n = 28$) | $P^{\dagger}$ |
|---|---|---|---|
| Gender | | | 0.23 |
| Female | 1 | 9 | |
| Male | 10 | 19 | |
| Marital status | | | 1.00 |
| Married | 2 | 7 | |
| Others[‡] | 9 | 21 | |
| Education | | | 1.00 |
| >9 years | 5 | 14 | |
| ≤9 years | 6 | 14 | |
| Occupation | | | 1.00 |
| Unemployed | 8 | 20 | |
| Others[§] | 3 | 8 | |
| Living status | | | 1.00 |
| Living alone | 1 | 4 | |
| Others[¶] | 10 | 24 | |
| Diagnosis | | | 0.04 |
| Mood disorders[††] | 0 | 9 | |
| Schizophrenia | 11 | 19 | |
| AUD | | | 0.16 |
| AD | 11 | 22 | |
| AA | 0 | 6 | |

[†]Fisher's exact test; [‡]Including single, widows, and divorced, [§]including employed, students, housewife and retired persons, [¶]including living with family or in an institution, [††]mood disorders include bipolar I disorder and major depressive disorder.
AA, alcohol abuse; AD, alcohol dependence; AUD, alcohol use disorder.

variation in AUD comorbidity remain unclear. One possible explanation may be genetic differences in, for example, alcohol-metabolizing genes for alcohol dehydrogenase (*ADH*) and aldehyde dehydrogenase (*ALDH*). Previous studies showed that compared to Caucasian subjects, Eastern Asian subjects have higher rates of *ALDH2*2* and *ADH2*2*, which have protective effects against alcoholism, in Taiwan.[25–27] The genetic variation may explain, at least in part, the relative lower prevalence of AUD in the present sample.

Due to the limited number of subjects and wide variation of the prevalence estimate in the present patients with mood disorder, interpretation of such results should be cautious. In the past, by applying combination of chart reviews and psychiatric interviews with patients and family members, Tsai *et al.* found that 9.9% of Taiwanese patients with bipolar disorder treated in a psychiatric hospital had current or past AUD.[16] Lin *et al.*, using SCID to ascertain diagnosis, reported that only 6.1% of inpatients with mood disorder had AUD in a general hospital psychiatric unit.[9] In addition to the disparity in patient profile or study design, both studies were conducted 10 years ago. Whether the prevalence of AUD among patients with mood disorders has increased in the last 10 years remains to be investigated using a larger sample in the future.

The present result showed that the prevalence of alcohol dependence (8.3%) was much higher than that of alcohol abuse (1.5%). Paralleled, the phenomenon has also been noted in previous studies.[9,13,15,22] The trend was distinct from that in the general population, among whom prevalence of alcohol abuse was higher than that of alcohol dependence.[28,29] The high presentation of alcohol dependence among patients with severe mental illness was indeed an interesting clinical observation. It has been postulated that the relatively low odds of lifetime co-occurrence of alcohol abuse as well as the high odds of dependence seem to demonstrate that when people have a severe mental illness, it tends to be severe and consistent with dependence progression rather than abuse.[30] Furthermore, it has been proposed that a common neurocircuitry is implicated in both addiction and mental illness. For instance, in schizophrenia the abnormal hippocampal afferents to the nucleus accumbens (NAc) and prefrontal cortex (PFC) and the facilitation of dopamine signaling result in an altered motivational system due to a failure of PFC control over NAc neurons. These abnormalities may create a reward-activated, relative hyperdopaminergic state induced by addictive drugs, producing a higher vulnerability to drug-seeking behavior and producing 'neural and motivational changes similar to long-term substance abuse'. This neurochemical evidence supports our observation of higher dependence rather than abuse rate in patients with severe mental illness.[31]

The present study found a low identification rate of AUD (28.2%). This observation is consistent with the findings of earlier studies, of high non-detection rate of substance use disorders in psychiatric settings.[8,9] One of the potential reasons for AUD underdiagnosis among patients with mood disorders is that alcohol disinhibits emotion and behavior, which then appears as mood disorder instead of AUD. Based on the present results we suggest that a validated screen-

ing tool for AUD, such as AUDIT, is needed to detect high-risk individuals. Therefore, protocols for the assessment and management of such patients should be developed to promote appropriate and effective interventions.

Generalization of the present study data should be cautious due to study limitations. First, we recruited inpatients with severe mental illness from one psychiatric hospital, which is not representative of the whole patient profile in Taiwan. Second, the sample size of patients with mood disorders was small and thus yields high variation of prevalence estimate in this group. A larger sample is needed to verify such findings. Third, the sample included only psychiatric inpatients. Because patients with alcohol dependence are at high risk for hospital admission,[5] the prevalence of AUD in psychiatric inpatients might be overestimated. Fourth, screen-negative patients in the second phase had relatively low AUDIT score compared to those who did not enter the second phase. Although AUDIT scores among screen-negative patients in phase 1 ranged from 0 to 7, screen-negative patients who entered the second phase interview had scores ranging from 0 to 3. The impact of such selection bias was twofold: to underestimate the prevalence of AUD if some screen-negative patients with high AUDIT score had AUD, and to make the validity of AUDIT perfect (100% sensitivity and 99.2% specificity at optimal cut-off 7/8). Fifth, we defined identification of AUD according to review of medical records instead of interview with in-charge staff. Rumpf *et al.* has reported that use of medical records only might cause underestimation of the identification rate.[32]

In conclusion, patients with severe mental illness and comorbid AUD were common in Taiwan. The prevalence is not as high as that in Western societies. Low identification rate of AUD implies that a validated screening questionnaire, such as AUDIT, is necessary to detect high-risk patients. We suggest that future research should use larger sample size to estimate the prevalence of AUD among different diagnostic groups and to address the sensitivity and specificity of AUDIT to screen AUD in psychiatric settings.

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