Risk Factors Associated with Substance Abuse among Patients with Schizophrenia: Data from the National Mental Health Registry (NMHR) in Malaysia

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Abstract

Objective: To measure the prevalence of substance abuse and the associated risk factors among newly diagnosed patients with schizophrenia. **Methods:** The National Mental Health Registry (NMHR) in Malaysia contains a database of newly diagnosed patients with schizophrenia (N=4854) from 2003-2005. A Schizophrenia Notification Form was filled out by the treating physician and patients were evaluated on substance type and use within the past 6 months. Demographic information, clinical history, family history of schizophrenia, circumstances of coming into contact with obtaining psychiatric services, and type of care setting were also recorded. **Results:** The prevalence of substance abuse among patients was 16% (n=756). The factors significantly associated with substance abuse were those under 25 years of age, being a Malaysian citizen and being brought into seek psychiatric services by the police. Protective risk factors included female, being a student, experiencing chronic versus acute symptoms of schizophrenia, and patients within the outpatient clinic or community psychiatric services versus inpatients. **Conclusion:** The data demonstrate that younger individuals particularly men, brought by police and schizophrenic hospitalized patients were predictors for substance use. These findings expand knowledge on the factors contributing to the co morbidity of substance abuse and schizophrenia in Malaysia.

Keywords: Substance abuse, schizophrenia, NMHR, incidence

1.0 Introduction

The co-morbidity of substance abuse and schizophrenia has been an enduring problem globally. In studies examining this association, the rates of substance abuse are higher among individuals diagnosed and living with schizophrenia than rates among the general population (Cantor-Graae, Nordstrom, & McNeil, 2001). While the rates of substance abuse among schizophrenic patients vary by country, a prevalence of substance abuse between 20-70% has been recorded (Barnes, Mutsatsa, Hutton, Watt, & Joyce, 2006; Brown, Bennett, Li, & Bellack, 2011; Cantor-Graae et al., 2001; Chakraborty, Chatterjee, & Chaudhury, 2014; Dixon, 1999; Fowler, Carr, Carter, & Lewin, 1998; Hambrecht & Hafner, 1996; Havassy, Alvidrez, & Owen, 2004; Regier et al., 1990; Volkow, 2009). More recent studies have found that more than half of those with schizophrenia also had a substance use disorder (Cantor-Graae et al., 2001; Regier et al., 1990; Sara, Burgess, Malhi, Whiteford, & Hall, 2014; Volkow, 2009).

The potential risk factors associated with substance abuse among individuals diagnosed with schizophrenia are strongly related to demographic characteristics which are similar across geographic regions (Cantor-Graae et al., 2001; Dekker & Swets, 2013; Mueser et al., 1990; Schmidt, Hesse, & Lykke, 2011; Soyka et al., 1993).

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In a sample of hospitalized Swedish patients with schizophrenia, substance abuse was more frequent, specifically among men, younger individuals, and patients with a family history of substance abuse (Cantor-Graae et al., 2001). Those who initiated abuse did so much earlier than the time they first experienced schizophrenia-related symptoms (Cantor-Graae et al., 2001). In the United States, Swartz and colleagues found that the risk for substance use in schizophrenic patients was higher for patients who were males, had a lower education attainment, were homeless and had a history of childhood conduct issues (Swartz et al., 2006) (Brown et al., 2011). Cannabis use has also been identified as an important risk factor for the development of schizophrenia (Malchow et al., 2013). In a 2006 study conducted in the United Kingdom by Barnes and colleagues, it was found that cannabis use was a potential risk factor for the onset of schizophrenia, and those who abused cannabis at a young age were more at risk of developing first-episode schizophrenia later and at a younger age (Barnes et al., 2006). A recent study in Australia found that those with a stimulant or cannabis use disorder were much more likely to be re-admitted as an inpatient, to be subject to self-harm/injury or infectious diseases, and to experience homelessness in comparison to those without a substance use disorder (Sara et al., 2014).

Substance use can potentially alter the symptoms and progression of schizophrenia in individuals (Dequardo, Carpenter, & Tandon, 1994). The importance of identifying substance abuse among patients with schizophrenia is highly emphasized as it is associated with negative outcomes with regards to increased morbidity and poorer life outcomes (Kerfoot et al., 2011; Koola et al., 2012; Schmidt et al., 2011). A recent study stated that, within the 15 years period of being diagnosed, individuals with a dual diagnosis had more severe symptoms; increased number of hospitalizations; similar risk of institutionalization and homelessness when compared to those with only schizophrenia(Schmidt et al., 2011). The long-term impacts of substance abuse and schizophrenia are still being examined. In Malaysia, there are no published reports that have looked at the co-morbid issue of substance abuse and schizophrenia among residents. A previous study published by the National Mental Health Registry in Malaysia found the incidence of schizophrenia to be 5 cases per 100 000 population/year from 2003 to 2005 (Aziz et al., 2008). The closest study examining substance abuse among an Asian population was in Singapore, where the rates of substance abuse were lower than studies conducted in north America and Europe (Verma, Subramaniam, Chong, & Kua, 2002).

Data from the National Mental Health Registry (NMHR) was used for this study in exploring what correlates are associated with the risk of substance abuse among newly diagnosed schizophrenia patients. The present study includes the largest sample of clinically diagnosed patients with schizophrenia obtained from the NMHR in Malaysia. The purpose of this study was to quantify the prevalence of substance abuse in a large sample of newly diagnosed patients with schizophrenia and to identify potential risk factors that are associated with substance abuse.

2. Methods

2.1 Study design and sample

Data were obtained from the NMHR from January 2003 to December 2005. A Schizophrenia Notification Form was filled out by the treating physician for every newly diagnosed patient with schizophrenia, defined as having no prior contact with psychiatric services. The registry was implemented in government hospitals located in all states of Malaysia. Further information on the registry is described in Aziz et al (Aziz et al., 2008): National Mental Health Registry. Link: http://www.ncbi.nlm.nih.gov/pubmed/19227671. A diagnosis of schizophrenia was made based on criteria from the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-4). Thus, this study includes all incident cases of schizophrenia that were seen in a government inpatient hospital, outpatient clinic, or community program where medical officers identify individuals with mental illnesses in community settings.

2.2 Measures

2.2.1 Substance use and schizophrenia

Patients were asked about their use of illicit substances within the past 6 months and the type of substance(s) used, including cannabis, alcohol, meth/amphetamine, inhalant, opiate and others. Since data were collected in 2003, schizophrenia subtype was divided based on the DSM-IV but were collapsed into general schizophrenia and schizophreniform disorder due to the irrelevancy of the original subtypes after implementation of the Diagnostic and Statistical Manual of Mental Disorders 5th Edition (DSM-5).

2.2.2 Demographic, clinical profile, family history, and pattern of care

A wide spectrum of information was gathered such as demographics, clinical history including the presence of a chronic disease, duration of untreated schizophrenia in months, age of onset of schizophrenia, family history of schizophrenia, circumstances of coming into contact with psychiatric services, and the type of care setting in which they were diagnosed.

Patients were categorized into two groups: below the age of 25 or above. Their citizenship was recorded as either Malay or non-Malay; and their ethnic group as: Malay, Chinese, Indian and others including Orang Asli, Kadazan, and Iban. Patients were asked to characterize their marital status as either single (not in a relationship, divorced, widowed, and separated) or married. Patients were categorized into five regions divided up by city and state, including four within peninsular Malaysia. These four regions were central (Selangor, Kuala Lumpur, Putrajaya), northern (Perlis, Kedah, Pulau Pinang, Perak), southern (Negeri Sembilan, Melaka, Johor), eastern (Terengganu, Kelantan, Pahang) and Sabah and Sarawak, which are located in east Malaysia. Patients were asked what religion they belonged to: Islam, Buddhism, Hinduism, Christianity, and others. Patients were asked to indicate their education level as either having completed primary school or less (including no formal schooling) or having completed secondary or tertiary (diploma, degree, masters, or Ph.D.) school. Patients were asked to indicate their employment status as either unemployed or self-employed, working full-time or part-time. Present Occupation was divided into four groups, which included having no profession (being unemployed), professional/owner/military/fireman/police, service/agriculture/sales/factors/homemaker, and student.

With respect to clinical history, patients were categorized as having or not having a current medical illness, the number of months that their symptoms of schizophrenia were left untreated, the age of onset of their illness in years, and the severity of symptom onset at time of diagnosis. A family history of schizophrenia present in parents and siblings was recorded. Lastly, process of care was measured by type of referral that the patient underwent (self-referral, brought by family or friends, brought by police, court order) and the care setting they were seen in (inpatient clinic, outpatient clinic and/or community).

2.3 Data analysis

Descriptive analyses were conducted to determine the frequencies of demographic variables, clinical history measures, family history and process of care divided by year. A bivariate analysis was conducted to compare the frequency of categorical exposures among patients with and without substance abuse using the Pearson chi-square test (x^2) as well as stratification by schizophrenia subtype (general schizophrenia or schizophreniform disorder). In the bivariate analysis, the unadjusted odds ratio (OR) and 95% confidence interval (95% CI) using simple logistic regression were measured. For the multivariate analysis, all variables that were used in the bivariate analysis were tested in determining the final model using the backward selection method. The association between substance abuse and the potential predictors were measured by odds ratio (OR) and 95% confidence interval (95% CI) using multiple logistic regression. The final model was based on the values of the explanatory variables that were statistically significant. All analyses were conducted at 5% significance level. Data were analyzed using Statistical Analysis Software (SAS), version 9.3.

3. Results

3.1 Descriptive and bivariate analyses

A total of 4854 patients with schizophrenia were included in the study and were considered incident patients with schizophrenia. The number of incident patients was 1342, 1284 and 1198 each year from 2003-2005 respectively, which signifies a declining trend. The demographic, family history, pattern of care and clinical history characteristics were similar in frequency across the years (Table 1).

Table 1: Distribution of demographics, clinical history, family history and pattern of care among Schizophrenic Patients by year (N=4854)

Characteristic	2003 (n=1342) n(%)	2004 (n=1284) n(%)	2005 (n=1198) n(%)
Sex			
Female	505(38)	464(36)	471(39)
Male	837(62)	820(64)	727(61)
	m[l]=3		
Age in years			
0-25	795(59)	725(57)	690(58)
30+	547(41)	559(43)	508(42)
State			
Central region[a]	191(15)	197(15)	189(16)
Northern region[b]	384(29)	426(33)	430(36)
Southern region[c]	247(19)	194(15)	217(18)
Eastern region[d]	263(20)	248(19)	190(16)
Sarawak & Sabah	221(17)	212(17)	166(14)
	m[l] =36	m[l] =7	m[l] =6
Citizenship			
Malaysian	1301(97)	1250(97)	1161(97)
Non-Malaysian	41(3)	34(3)	37(3)
Race			
Malay	750(56)	776(61)	680(57)
Chinese	296(22)	257(20)	276(23)
Indian	104(8)	97(8)	104(8)
Others[e]	189(14)	152(12)	138(12)
	m[l] =3	m[l] =2	
Religion			
Islam	838(6)	841(66)	744(63)
Buddhism	261(20)	232(18)	238(20)
Christian	120(9)	88(7)	85(7)
Hinduism	90(7)	86(7)	96(8)
Others	33(3)	33(2)	24(2)
		m[l] =4	m[l] =11
Marital status			
Married	315(24)	284(23)	239(21)
Not-married[f]	999(76)	966(77)	906(79)
	m[l] =28	m[l] =34	m[l] =53
Education			
<=Primary school	389(30)	357(28)	341(30)
Secondary/tertiary schooling[g]	919(70)	897(72)	815(70)
	m[l] =34	m[l] =30	m[l] =42
Working status			
Not employed	889(66)	867(68)	811(68)
Self-employed/FT/ PT[h]	453(34)	417(33)	381(32)
Profession			
No profession	605(45)	652(51)	571(48)
Pro/owner/mil/fir/police[i]	102(8)	108(8)	85(7)

Ser/agric/sales/fact/hom[j]		483(36)	405(32)	393(33)
Student		152(11)	117(9)	148(12)
			m[l] =2	m[l] =1
Clinical history				
Chronic illness				
	Yes	106(8)	114(9)	84(7)
	No	1236(92)	1170(91)	1114(93)
			m[l] =1	
Schizophrenia-related				
DUI[k]				
	<=12	81(58)	770(60)	712(59)
	>12	561(42)	514(40)	486(41)
Onset of illness in years				
	0-29	735(55)	674(53)	663(55)
	30+	607(45)	610(47)	535(45)
Onset of symptoms				
	Acute	490(38)	479(40)	462(41)
	Acute to chronic	251(20)	280(23)	232(21)
	Chronic	264(21)	233(20)	200(18)
	Insidious	276(21)	203(17)	225(20)
		m[l] =61	m[l] =89	m[l] =79
Family History				
General – parents or sibling(s)				
Yes		320(24)	298(23)	255(21)
No		1020(76)	985(77)	936(79)
		m[l] =2		m[l] =7
Process of Care: referral type				
Self-referral				
Yes		90(7)	76(6)	91(8)
No		1252(93)	1208(94)	1107(92)
Family				
Yes		897(67)	852(66)	790(66)
No		445(33)	432(34)	408(34)
Brought by police				
Yes		234(17)	225(17)	184(15)
No		1108(83)	1059(83)	1014(85)
Friend				
Yes		30(2)	32(3)	29(2)
No		1312(98)	1252(98)	1169(98)
Court order				
Yes		27(2)	21(2)	19(2)
No		1315(98)	1263(98)	1179(98)
Care setting				
Inpatient hospital		682(54)	680(57)	663(59)
Outpatient clinic/community		582(46)	509(43)	460(41)
		m[l] =27	m[l] =95	m[l] =75

[a] Central region: Selangor, Kuala Lumpur, Putrajaya
[b] Northern region: Perlis, Kedah, Pulau Pinang, Perak
[c] Southern region: Negeri Sembilan, Melaka, johor
[d] eastern region: Terengganu, Kelantan, Pahang

[e] Other race: Iban, Kadazan, Orang Asli, etc.
[f] Not married: single, divorced, widowed, separated
[g] Secondary schooling and tertiary schooling: degree, diploma, Masters, PhD
[h] FT: full-time; PT: part-time employment
[i] Professional, owner, military, firemen, policemen
[j] Service, agriculture, sales, factory worker, homemaker
[k] DUI: Duration of untreated illness
[l] m=missing values

     Among the total study sample (n=4854), findings show that there were more males (63%) than females, those younger than 25 years old (57%), having Malaysian citizenship (97%), single status (77%), attended or completed secondary schooling and/or tertiary schooling (70%), and those who were unemployed (67%). The majority of patients lived in the eastern region (19%), followed by southern (17%), northern (16%), Sabah and Sarawak (15%) and central (14%). The majority of patients were Malay (58%), followed by Chinese (22%), other race (12%) and Indian (8%). Among those who were employed (52%), 8% were employed as professional/manager/owner/military/firemen/police, 33% were in the service/agriculture/sales/factory industry/homemaker group, and 11% were students. In the sample, only 8% of patients had a current chronic illness. The mean duration of untreated psychosis was about 34 months with the upper range being 708 months (n=4790, median=12 months, interquartile range=1.0 months). Nearly half of the patients had an onset of illness at or less than 29 years of age and the remaining with an onset equal to or above 30 years old. Thirty-nine percent of patients had acute symptoms of schizophrenia, followed by 21% acute to chronic, 19% chronic, and 20% insidious. Among the type of referrals patients received, 332 referred themselves, 3198 were referred by their family, 803 were brought in by police, and 85 had a court order. A little more than half of the patients obtained a diagnosis of schizophrenia at an inpatient hospital (57%) and the remaining at an outpatient clinic or through the community program (Table 2).

Table 2: Clinical characteristics of schizophrenia among patients (N=4854)

Characteristic	n(%)
Schizophrenia subtype	
Schizophrenia[a]	3870(80)
Schizophreniform disorder	975(20)
	m[c]=9
DUI[b]	
N, mean, median, IQR, range	
4790, 34.4,12, 1.0, 0-708	
Age of onset of illness	
0-29	2588(53)
30+	2266(47)
Onset symptoms	
Acute	1791(39)
Acute to chronic	972(21)
Chronic	874(19)
Insidious	913(20)
	m[c] =304

[a] Schizophrenia: includes schizoaffective disorder
[b] DUI: duration of untreated illness
[c] m=missing values

     The prevalence of any substance abuse among these patients was about 16% (n=756) and the most common substances used were cannabis (52%), meth/amphetamine (32%), and opiate (18%). The prevalence of substance abuse by year was 14.2% (95% CI: 12.5-16.2%) in 2003, 17.1% (95% CI: 15.1-19.2%) in 2004 and 15.7% (95% CI: 13.7-17.9%) in 2005.

The majority of patients reported using only one substance (70%) and the remaining used two or more substances (Table 3). The general type of schizophrenia and schizophreniform disorder was observed to be the highest subtype (80%).

Table 3: Substance abuse characteristics of schizophrenia patients (N=4854)

Characteristic		n(%)
Substance abuse		
	Yes	756(16)
	No	4098(84)
Number of substances abus		
	1	508(69.9)
	2	160(22.0)
	3	46(6.3)
	4	10(1.4)
Type of substance abused	5	3(0.4)
Cannabis		
	Yes	394(52)
Opiate	No	362(48)
	Yes	139(18)
Amphetamine	No	617(82)
	Yes	241(32)
Inhalant	No	515(68)
	Yes	102(13)
Alcohol	No	654(87)
	Yes	129(17)
	No	627(83)

Age, citizenship, race, religion, marital status, formal education, working status, profession, clinical history of chronic illnesses, duration of untreated psychosis, onset of symptoms, family referral, police referral and care setting were found to be significantly associated with substance abuse (p-value <0.05) (results not shown). We also conducted an analysis of the different risk factors by schizophrenia subtype to determine whether there are differences among those with substance abuse and a specific diagnosis of schizophrenia. With stratification, we found that marital status, state, employment status, education, occupation type, presence of a medical illness, age of onset of schizophrenia, characteristic onset, care setting type, self-referral, family referral, police referral and court order were associated with the risk of schizophrenia (including schizoaffective disorder) (p-value <0.05) (Table 4).

Table 4: Correlates of risk factors in patients with and without substance abuse

Characteristic	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Sex		
Female	0.04(0.03-0.06)**	0.05(0.03-0.08)**
Male	Reference	Reference
Age		
0-25	1.91(1.62-2.26)**	1.90(1.57-2.31)**
30+	Reference	Reference
State		
Central Region[a]	Reference	
Northern Region[b]	0.85(0.67-1.08)	
Southern Region[c]	0.68(0.51-0.90)	
Eastern Region[d]	1.02(0.79-1.31)	
Sarawak & Sabah	0.63(0.47-0.84)	
Citizenship		
Malaysian	2.08(1.15-3.78)*	2.92(1.52-5.62)**
Non-Malaysian	Reference	Reference
Race		
Malay	Reference	
Chinese	0.81(0.60-1.09)	
Indian	0.78(0.64-0.96)	
Others[e]	0.66(0.51-0.87)	
Religion		
Islam	Reference	
Buddhism	0.79(0.64-0.97)	
Christian	0.79(0.57-1.09)	
Hinduism	0.62(0.44-0.87)	
Others	0.56(0.30-1.01)	
Marital status		
Married	0.43(0.35-0.55)**	
Not-married[f]	Reference	
Education		
<=Primary School	Reference	
Secondary /Tertiary School[g]	1.29(1.08-1.541)**	
Working status		
Not Employed	Reference	
Self-employed/FT/ PT	1.43(1.22-1.68)**	
Profession		
No Profession	Reference	
Prof/Owner/Mil/Firemen/Po	0.99(0.74-1.32)**	Reference
Servic/Agric/Sales/Fact/Home	0.81(0.68-0.96)*	
Student	0.27(0.18-0.40)**	0.28(0.19-0.43)**
Clinical History		
Chronic Illness		
No	Reference	
Yes	1.58(1.13-2.20)**	
Schizophrenia-related		

Age of onset of Illness		
0-29	Reference	
30+	0.76(0.65-0.89)**	
DUI[h]		
0-12 Months	Reference	
>12 Months	0.85(0.72-1.00)*	
Onset of Symptoms		
Acute	Reference	Reference
Acute to Chronic	1.25(1.02-1.53)**	
Chronic	0.64(0.50-0.82)**	0.77(0.60-0.99)*
Insidious	0.83(0.66-1.04)	
Family History		
General		
Yes	0.86(0.71-1.04)	
No	Reference	
Process of Care		
Type of referral		
Self-Referral		
Yes	0.75(0.54-1.05)	
No	Reference	
Family		
Yes	0.67(0.57-0.79)**	
No	Reference	
Brought by police		
Yes	2.48(2.07-2.96)**	1.50(1.20-1.87)**
No	Reference	Reference
Friend		
Yes	0.85(0.50-1.44)	
No	Reference	
Court Order		
Yes	1.58(0.94-2.64)	
No	Reference	
Care setting		
Inpatient Clinic/Hospital	Reference	Reference
Outpatient Clinic & Community	0.48(0.41-0.57)**	0.68(0.56-0.83)**

*p< 0.05
**p<0.01

Race, marital status, state, occupation type, care setting, self-referral and police referral were associated with schizophreniform disorder (p-value <0.05). Since there was not a large difference between the two subtypes, it was decided to present the results as schizophrenia (results not shown).

3.2 Multivariate analysis

The correlates that were significantly associated with a risk of substance abuse were: those under 25 years of age (Odds Ratio (OR): 1.90, 95% Confidence Interval (CI): 1.57-2.31), being a Malaysian citizen (OR=2.92, 95% CI: 1.52-2.62), and being brought into seek psychiatric services by the police (OR=1.50, 95% CI: 1.20-1.87). Protective risk factors included female sex (OR=0.05 95% CI: 0.03-0.08), being a student (OR=0.28, 95% CI: 0.19-0.43), exhibiting chronic versus acute symptoms of schizophrenia (OR=0.77 95% CI: 0.60-0.99) and patients arising from the outpatient clinic or community psychiatric services versus inpatients contributed less to the risk of substance abuse (OR=0.68, 95% CI: 0.56-0.83) (Table 4).

4. Discussion

These results indicate that the prevalence of substance abuse among schizophrenic patients in Malaysia is much lower than the rates found in studies in other countries (Barnes et al., 2006; Cantor-Graae et al., 2001). Among those who reported drug abuse, more than half of the sample reported cannabis as the most common substance used. This finding is consistent with literature on studies examining the most common substance used among individuals with schizophrenia (Cantor-Graae et al., 2001; Dequardo et al., 1994; Malchow et al., 2013). The implications of cannabis use has been related to substance induced psychosis and is an intermediate factor linked to the development of schizophrenia (Malchow et al., 2013; Radhakrishnan, Wilkinson, & D'Souza, 2014; Szoke et al., 2014). Many recent reports have established the relationship between cannabis use and substance induced psychosis, including dose-response relationship between adolescents who abuse cannabis and the development of psychosis later in life (Hall, Degenhardt, & Teesson, 2004; Henquet et al., 2005; Le Bec, Fatseas, Denis, Lavie, & Auriacombe, 2009; McGrath et al., 2010; Radhakrishnan et al., 2014).

This study found that males were at higher odds of substance abuse in comparison to women with schizophrenia and that being female is a protective risk factor. Previous studies in other cultures in North America and Europe have found that male gender, unemployment, and depression were strongly associated with the risk of substance abuse among individuals with schizophrenia (Cantor-Graae et al., 2001; Jimenez-Castro et al., 2010). These findings are consistent with previous studies conducted where gender and younger age are risk factors for substance abuse (Cantor-Graae et al., 2001; Jimenez-Castro et al., 2010). In studies conducted in India and Singapore, distinct gender differences and higher rates of substance use among male were consistent; nonetheless, a lower overall prevalence of substance abuse was found in comparison to other studies (Chakraborty et al., 2014; Verma et al., 2002).

Demographic and clinical factors such as the duration of untreated psychosis, age of onset of schizophrenia, level of education and working status were not risk factors for the presence of substance abuse. Protective risk factor identified in this study were that being a student reduced the risk of substance abuse. Also, being seen by a physician in an outpatient clinic or community as opposed to an inpatient hospital were protective towards the risk of substance abuse.

In this study, the relationship between substance use and the onset of schizophrenia cannot be established in terms of temporality and this relationship has also been unclear in the literature (Rabinowitz et al., 1998). Published reports determining this relationship were subject to small sample sizes, limitations, and utilized different diagnostic methods to determine schizophrenia and substance abuse (Mueser et al., 1990). This study assessed both substance abuse and schizophrenia simultaneously and the study did not determine which one preceded the other.

Strength in this study was the utilization of data for a large number of patients diagnosed with schizophrenia. Strength is that the sample is based on incident cases and is representative of the patients who are diagnosed with schizophrenia. In comparison to other studies, this sample was much larger and contained incident cases. Although this study did not capture patients from private hospitals or undiagnosed cases without prior contact to psychiatric services, government hospitals are more affordable to Malaysian residents and a majority of patients utilize public hospitals. Therefore, this sample is representative of the population in terms of socioeconomic status and healthcare utilization among residents of Malaysia.

This study is not without limitations. Firstly, substance abuse was assessed using self-reports that would lead to underreporting. Secondly, Malaysian society stigmatize substance abuse and substance abuse is illegal in Malaysia. To address possible lower prevalence rates in future samples due to underreporting, future studies could incorporate a variety of diagnostic methods such as urine drug analysis or radioimmunoassay of hair specimens to detect the presence of substances; these methods have provided more reliable assessments of drug use in previous studies (Desmarais, Van Dorn, Sellers, Young, & Swartz, 2013). Thirdly, substance abuse was only studied based on past or current usage within a 6 month period and was not based on any criteria used for evaluating and diagnosing a substance use disorder, whereas other studies have used the DSM or ICD-10 criteria for identifying substance use disorder (Desmarais et al., 2013). This study does not distinguish between different types of substance use disorders, such as substance dependence. Previous studies utilized different methodologies for categorizing substance abuse.

The severity of symptoms related to psychosis, depression and quality of life among subjects in the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) study in the United States increased at different levels of drug use, which shows that the level of drug use can impact long-term life outcomes of co-morbid patients (Kerfoot et al., 2011). Another limitation in this study was the data source; the registry contained a limited amount of variables that could be used to assess potential risk factors for substance abuse among schizophrenia patients; thus, future studies will need to account for this limitation.

The findings demonstrate that younger individuals particularly men, brought by police and schizophrenic hospitalized patients were predictors for substance use. These findings expand knowledge on the factors contributing to the comorbidity of substance abuse and schizophrenia in Malaysia. However, the findings should be carefully interpreted.

For further recommendations, the assessment of co-morbid substance abuse and schizophrenia should be prioritized in clinical settings in Malaysia in order to ensure proper treatment will be administered. For example, among patients with schizophrenia and substance abuse, there is evidence that clozapine has been effective for treating symptoms associated with substance abuse (Kelly, Daley, & Douaihy, 2012; Mesholam-Gately, Gibson, Seidman, & Green, 2014). Treating both substance use disorders and schizophrenia continues to be a challenge in clinical settings by physicians and health care professionals (Bellack & Gearon, 1998).

Increased recognition of a history of substance abuse among patients with schizophrenia is needed to detect individuals with dual mental illnesses as there are several implications associated with the long-term health impacts.

Acknowledgements

6. References

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