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ORIGINAL PAPER

The prevalence of mental disorders in Taiwanese prisons: a nationwide population-based study

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Abstract

Purpose In Taiwan, few studies explored the morbidity of mental disorders among prisoners. The purpose of this study is conducted to estimate the prevalence of mental disorders in Taiwanese prisoners.

Methods Based on Nationwide population-based databank, 82,650 prisons were studied for mental disorders. Mental disorders were assessed with the International Classification of Diseases 9th revision Clinical Modification (ICD-9-CM).

Result The prevalence of mental disorders among prisoners was estimated 11.31%. Female prisons exhibited a higher prevalence than males (17.82% vs. 10.56%, $p < 0.01$). Among all cases that were diagnosed with the contents of mental disorder, anxiety, dissociative and somatoform disorders was the most frequent disease (total: 49.48%, female: 59.42%, male: 47.55%) followed by special symptoms or syndromes (total: 38.24%, female: 33.20%, male: 39.22%), drug dependence (total: 15.41%, female: 9.22%, male: 16.61%), episodic mood disorders (total: 13.56%, female: 26.15%, male: 11.12%), nondependent abuse of drugs (total: 11.23%, female: 2.77%, male: 12.87%) and depressive disorder (total: 11.23%, female: 11.66%, male: 11.14%).

Conclusion A substantial proportion of prisoners reported having mental disorders. The results suggests the necessity of comprehensive assessment and more treatment programs that offer alternatives to incarceration of mental health for the criminal justice system in Taiwan.

Keywords Prevalence · Mental disorders · Prisons · Population-based study

Introduction

Mental disorders is a behavioral or mental pattern that causes significant distress or impairment of personal functioning and now is one of major public health concern in the world [1]. The economic impacts of mental disorder include the effects of personal income, the ability of work and make productive contributions to the national economy, as well as the utilization of clinical treatment and support service systems [2]. In Asia area, population-representative prevalence data for this disorder not only is essential for evidence-based public health policy and planning, but also is substantial contributing to health loss across the lifespan [3, 4]. In Taiwan, the 1-year prevalence of any major psychiatric disorder, any minor psychiatric disorder, and any psychiatric disorder were 1.37%, 4.26%, and 5.30%, respectively. The differences in prevalence between the sexes were significant for major and minor psychiatric disorders [5]. Early detection by integrated screening regimens followed by appropriate clinical intervention may offer a practical means for the prevention of condition-associated mental disorders.

The mental disorders among prisoners are should be noticed. There are more than 10 million prisoners worldwide, and the prevalence of all investigated mental disorders is higher than general population comparisons [6]. Previous studies indicated that peoples in prison had 5–10 times more frequently severe mental disorders than that in the general population [7]. A meta-analysis also found that prison inmates were more likely than the general population to have a psychotic illness, major depression, or a personality

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disorder [8]. Certain disorders may be particularly prone to overestimation due to prisoners assessed by lay interviewers have been associated with higher prevalence compared to diagnostic interviews conducted by clinically trained psychiatrists or psychologists [6]. In addition, there is a growing population of mentally ill prisoners being insufficiently detected and treated [9, 10]. The well organized population-based studies on the morbidity and associated factors of mental disorders in prisons are decisive of helping to plan appropriate preventive policy for the criminal behaviors.

The heterogeneity of mental disorders prevalence estimates of prisoners may reflect real differences related to variations in community rates for individual disorders around the world. In Taiwan, however, although diagnostic interviews for mental disorders conducted by clinically trained psychiatrists, no prevalence estimates among prisoners. From the preventative medicine viewpoint, it is not only essential to be cognizant of the background morbidity of mental disorders regionally, but to explore the complete spectrum of demographic markers which may be related to mental disorders. Some uncertainty still exists as regards whether the prevalence for mental disorders reveal gender difference amongst a prisons population. In addition, the studies focused on mental health among prisoners in Asia were still insufficient. Thus, to identify the prevalence for mental disorders, this study is conducted so as to attempt to explore the potential for condition-related gender difference, because it was considered that such difference might underscore important implications for the understanding of the overall scenario of mental disorders among the prisons population in Taiwan.

Methods

Data source

In Taiwan, the National Health Insurance (NHI) is a compulsory single-payer healthcare system that covers more than 99% of the Taiwanese population. The National Health Insurance Research Database (NHIRD) provides anonymized linked data from the NHI for epidemiologic and clinical researches, encompassing the registration and demographic data of enrolees, healthcare services data from hospitals and general practices, and medication dispensing data from hospitals, general practices, and community pharmacies [11]. The NHIRD provides diagnosis data coded using the International Classification of Diseases 9th revision Clinical Modification (ICD-9-CM). The accuracy and completeness of this claim data such as ICD-9-CM diagnoses and medication records have been validated [12, 13].

To provide a more comprehensive medical service for the prisons, the prisoners housed in 49 correctional institutions in Taiwan have been included in the NHIRD since 2013 (National Health Insurance Administration, Ministry of Health and Welfare 2013). In this study, we identified prisoners from this specialized data set that contained all prisoners from January 1, 2013 to December 31, 2013 in the NHIRD. Due to aspects of NHIRD research pose formidable challenges for research ethics and thus show potential for wider applicability of formal review processes. The ethical frameworks for NHIRD research are highly contested and in flux, and the potential harms of data science research are unpredictable [13]. All procedures followed decision tree for determining whether data science research is covered by the Common Rule as human-subjects research were performed in accordance with the guidelines of Institutional Review Board of Cheng-Hsin General Hospital (CHGH-IRB: (471)104-07) and adhered to the tenets of the Declaration of Helsinki [14]. All patients' information was anonymous.

Study population

In this study, 82,650 prisoners were eligible population included 8,520 (10.31%) prisoners were females and 74,130 (89.69%) prisoners were males. In Taiwan, every prison has well-trained psychiatrists employed by affiliated hospitals. The prisoners typically meet with psychiatrists for "medical advice" no more than 1 week. They will get immediate assistance for the emergency mental illness. The psychiatrists diagnose the mental disorder when the inmates applied for medical advice and the NHIRD stored all the related ICD-9 codes. The list of ICD-9 codes 290–319 was used as the principal measure of mental disorders. Contents were parted in four groups: organic psychotic conditions (ICD-9 codes 290–294), other psychoses (ICD-9 codes 295–299), neurotic disorders, personality disorders, and other nonpsychotic mental disorders (ICD-9 codes 300–316), and intellectual disabilities (ICD-9 codes 317–319). To ensure data quality, prisoners had to be diagnosed at least three times in one group, and as a result the diseases interpreted as mental disorders.

Statistical analysis

Statistical analysis was performed using SAS for Windows, (SAS version 9.1; SAS Institute Inc., Cary, NC, USA). Categorical variables were described through absolute frequency and percentages. Prevalence has been also expressed by absolute frequency and percentages. The χ^2 method was adopted to assess difference in the percentage of categorical variables for the univariate analysis. A p value of <0.05 was considered to represent statistically significant difference.

Results

Demographics of the participating sample are shown in Table 1. The mean age of female and male prisoners was estimated 39.04 ± 11.23 yrs and 41.51 ± 11.37 years. The mean age of female prisoners with mental disorders was 41.21 ± 11.23 years and 42.13 ± 10.28 years in male. Drawing a parallel between total prison population and prisoners with mental disorders, the distribution of the age was similar. The number of times getting medicine services, prisoners' medical needs with mental disorders showed around twice as large as other prisoners'.

The gender specific prevalence of mental disorders are shown in Table 2. The prevalence of any mental disorders among female prisoners was 17.82%. Among all cases that were diagnosed with mental disorders, anxiety, dissociative and somatoform disorders (59.42%) was the most common disorder followed by special symptoms or syndromes (33.2%), episodic mood disorders (26.15%) and depressive disorder (11.66%) in female. The prevalence of any mental disorders among male prisoners was 10.56%. Among all cases that were diagnosed with mental disorders, anxiety, dissociative and somatoform disorders (47.55%) was the most common disorder followed by special symptoms or syndromes (39.22%), drug dependence (16.61%) and nondependent abuse of drugs (12.87%) in male.

The prevalence of most common mental disorders among study prisoners (Table 3) was anxiety, dissociative and somatoform disorders (5.59%) followed by special symptoms or syndromes (4.32%), drug dependence (1.74%), episodic mood disorders (1.53%) and nondependent abuse of drugs and depressive disorder (1.27%). There was a significant difference in the prevalence of episodic mood disorders between female and male and also the prevalence of nondependent abuse of drugs.

Discussion

In Taiwan, the major social, political, and economic changes have affected the patterns of crime and criminal justice policies and practices in Taiwan. The nation's criminal justice systems have undergone significant reforms and innovations. Previous studies examined issues of crime and criminal justice systems and added a promising field for cross-cultural research that could be used to generalize about theory and policy perspectives [15, 16]. To the best of our knowledge, this is the first study to report the mental disorders prevalence rates among a nationwide prison population-based database in Taiwan. The results indicated clearly that the prevalence of any psychiatric disorder among prisoners in Taiwan is higher than in the general population. In a Taiwanese general population, previous study estimated the prevalence of mental disorders among National Health Insurance enrollees in Taiwan to be 5.3%. It was concluded that both major and minor psychiatric disorders were undertreated in Taiwan [10]. In addition, Table 4 presents the different prevalence of mental disorders in various inmates populations [9, 17–31]. This disparity would likely be largely due to differences between different population stocks in addition to differences in the specifics of diagnostic criteria for such mental disorders.

In this study, the prevalence of mental disorders among prisoners is estimated 11.31%. To this extent, prison administrators need to know how many prisoners are having mental disorders. It has been widely reported that prisoners have elevated rates of mental disorders compared with the general population [7, 32]. Previous meta-analysis showed substantive regional differences in the prevalence of mental disorders. Low and middle income countries in East Asia and the Pacific grouping and within high income countries Asia were found to have significantly lower period and lifetime prevalence estimates than the pooled average [33]. The possible reason is that the lower population risk for common mental disorder in parts of Asia may be related to key cultural or other protective factors could not be discounted. In addition, differences in prevalence of mental disorders

Table 1 Demographic characteristics of the study prison subjects ($n = 82{,}650$)

	Total		Mental disorder	
	Female ($n = 8520$)	Male ($n = 74{,}130$)	Female ($n = 1518$)	Male ($n = 7826$)
Age				
Mean (standard deviation)	39.04 (11.23)	41.51 (11.37)	41.21 (10.48)	42.13 (10.28)
Range (minimum–maximum)	8–88	8–97	15–80	14–86
Medicine service times (per year)				
Mean (standard deviation)	9.93 (9.30)	8.43 (8.26)	18.06 (11.75)	17.77 (11.45)
Range (minimum–maximum)	1–75	1–105	3–75	1–105

Table 2 Gender specific prevalence of mental disorders of the study prison subjects ($n = 82,650$)

	Female			Male		
	n	%	mean age (SD)	*n*	%	mean age (SD)
Total prisoners	8520	100	39.04 (11.23)	74,130	100	41.51 (11.37)
Any mental disorders	1518	17.82	41.21 (10.48)	7826	10.56	42.13 (10.28)
Prisoners of any mental disorders	1518	100	41.21 (10.48)	7826	100	42.13 (10.28)
ICD9_290-294 organic psychotic conditions						
ICD9_290.0-290.9-dementias	3	0.2	66.33 (13.05)	25	0.32	71.64 (11.61)
ICD9_291.0-291.9-alcohol-induced mental disorders	12	0.79	43.33 (7.48)	205	2.62	45.69 (9.29)
ICD9_292.0-292.9-drug-induced mental disorders	68	4.48	38.74 (6.32)	586	7.49	41.16 (8.14)
ICD9_293.0-293.9-transient mental disorders due to conditions classified elsewhere	27	1.78	38.22 (7.32)	268	3.42	43.40 (9.75)
ICD9_294.0-294.9-persistent mental disorders due to conditions classified elsewhere	14	0.92	42.07 (9.04)	360	4.6	43.24 (9.93)
ICD9_295-299 other psychoses						
ICD9_295.0-295.9-Schizophrenic disorders	127	8.37	41.63 (9.17)	747	9.55	42.66 (8.99)
ICD9_296.0-296.9-episodic mood disorders	397	26.15	41.01 (9.21)	870	11.12	42.27 (10.18)
ICD9_297.0-297.9-delusional disorders	2	0.13	52.5 (10.61)	25	0.32	45.56 (13.22)
ICD9_298.0-298.9-other nonorganic psychoses	65	4.28	40.46 (8.65)	420	5.37	42.22 (9.74)
ICD9_299.0-299.9-pervasive developmental disorders	0	–	–	8	0.1	30.25 (8.41)
ICD9_300-316 neurotic disorders, personality disorders, other nonpsychotic mental disorders						
ICD9_300.0-300.9-anxiety, dissociative and somatoform disorders	902	59.42	41.38 (10.86)	3721	47.55	42.47 (10.63)
ICD9_301.0-301.9-personality disorders	37	2.44	34.70 (7.99)	93	1.19	37.72 (9.51)
ICD9_302.0-302.9-sexual and gender identity disorders	0	–	–	3	0.04	29.33 (10.60)
ICD9_303.0-303.9-alcohol dependence syndrome	25	1.65	40.60 (9.04)	246	3.14	44.18 (8.83)
ICD9_304.0-304.9-drug dependence	140	9.22	38.43 (8.59)	1300	16.61	41.81 (8.82)
ICD9_305.0-305.9-nondependent abuse of drugs	42	2.77	38.12 (8.75)	1007	12.87	39.73 (8.25)
ICD9_306.0-306.9-physiological malfunction arising from mental factors	2	0.13	29.5 (3.54)	18	0.23	44.5 (11.41)
ICD9_307.0-307.9-special symptoms or syndromes not elsewhere classified	504	33.2	39.97 (10.83)	3069	39.22	42.34 (10.08)
ICD9_308.0-308.9-acute reaction to stress	2	0.13	36.50 (13.44)	9	0.12	43.33 (10.28)
ICD9_309.0-309.9-adjustment reaction	71	4.68	39.30 (10.08)	434	5.55	39.87 (10.38)
ICD9_310.0-310.9-specific nonpsychotic mental disorders due to brain damage	0	–	–	23	0.29	43.04 (10.72)
ICD9_311.0-311.9-depressive disorder, not elsewhere classified	177	11.66	39.90 (9.39)	872	11.14	43.05 (10.05)
ICD9_312.0-312.9-disturbance of conduct not elsewhere classified	9	0.59	18.78 (1.86)	78	1	29.27 (12.20)
ICD9_313.0-313.9-disturbance of emotions specific to childhood and adolescence	3	0.2	19.00 (1.00)	14	0.18	18.07 (2.06)
ICD9_314.0-314.9-hyperkinetic syndrome of childhood	3	0.2	17.33 (2.08)	53	0.68	19.11 (3.88)
ICD9_315.0-315.9-Specific delays in development	0	–	–	0	–	–
ICD9_316.0-316.9-Psychic factors associated with diseases classified elsewhere	1	0.07	42.00 (0)	5	0.06	43.80 (4.55)
ICD9_317-319 intellectual disabilities						
ICD9_317.0-317.9-Mild intellectual disabilities	10	0.66	33.50 (12.57)	25	0.32	37.44 (12.66)
ICD9_318.0-318.9-other specified intellectual disabilities	2	0.13	33.50 (13.44)	18	0.23	32.61 (7.46)
ICD9_319.0-319.9-unspecified intellectual disabilities	5	0.33	43.60 (9.63)	27	0.35	35.37 (9.76)

SD standard deviation

could be explained by differences in sampling which would affect sociodemographic characteristics of the populations studied or differences in ascertainment methods, clinical syndromal profiles of cases, and the toxic or withdrawal effects of psychoactive substances on mental functioning [5]. Generally, individuals combined with behavioral disorders would need integrated treatment and get less positive outcomes than those with simpler presentations [34]. From the public health viewpoint, researchers noted the importance of evaluating impairment related to these substantial mental

Table 3 The prevalence of most common mental disorders among study prisoners

	Total	Female		Male		P for χ^2 test
	%	*n*	%	*n*	%	
Total prisoners		8520		74,130		
ICD9_290-319 mental disorders	11.31	1518	17.82	7826	10.56	< 0.0001
ICD9_300.0-300.9 anxiety, dissociative and somatoform disorders	5.59	902	10.59	3721	5.02	< 0.0001
ICD9_307.0-307.9 special symptoms or syndromes not elsewhere classified	4.32	504	5.92	3069	4.14	< 0.0001
ICD9_304.0-304.9 drug dependence	1.74	140	1.64	1300	1.75	0.46
ICD9_296.0-296.9 episodic mood disorders	1.53	397	4.66	870	1.17	< 0.0001
ICD9_305.0-305.9 nondependent abuse of drugs	1.27	42	0.49	1007	1.36	< 0.0001
ICD9_311.0-311.9 depressive disorder, not elsewhere classified	1.27	177	2.08	872	1.18	< 0.0001

Table 4 Prevalence of mental disorder among prisons in various populations

Author (year)	Study design	Study period	Screened number	Setting	Prevalence of mental disorder (%)	Reference
Jüriloo et al. (2017)	Trend study	2005–2016	3136	Finland	Female: 0.6, male: 5.3 (2016)	[17]
Al-Rousan et al. (2017)	Cross-sectional study	2015	8574	Iowa	Total: 47.7	[18]
Gates et al. (2017)	Cross-sectional study	2005–2010	10,988	East south central region of the United States	Total: 27.8	[19]
Zabala-Baños et al. (2016)	Cross-sectional study	–	184	Spain	Total: 52.2	[9]
El-Gilany et al. (2016)	Cross-sectional study	2013–2014	1350	Egypt	Female: 22.4, male: 22.5	[20]
López et al. (2016)	Cross-sectional study	2010	472	Andalusia (Spain)	Male: 25.8	[21]
Alevizopoulos et al. (2016)	Cross-sectional study	2006	495	Greece	Male: 45.06	[22]
Abdulmalik et al. (2014)	Cross-sectional study	2012–2013	394	Ibadan (Nigeria)	56.6	[23]
Sepehrmanesh et al. (2014)	Cross-sectional study	2011–2012	159	Kashan (Iran)	Total: 43.4	[24]
Andreoli et al. (2014)	Cross-sectional study	2006–2007	1809	Sa˜o Paulo, Brazil	Female: 39.2, male: 22.1	[25]
Mundt et al. (2013)	Cross-sectional study	2007	1008	Chilean	Total: 26.6	[26]
Heffernan et al. (2012)	Cross-sectional study	2008	396	Queensland	Female: 86.1, male: 72.8	[27]
Vicens et al. (2011)	Cross-sectional study	2007–2008	707	Spain	Total: 41.2	[28]
Falissard et al. (2006)	Cross-sectional study	2003–2004	800	France	Male: 27.4	[29]
Tye et al. (2006)	Cross-sectional study	2000	103	Victoria	Female: 84	[30]
Fotiadou et al. (2006)	Cross-sectional study	2000	80	Greece	Male: 78.7	[31]

health problems, given that impairment could affect personal functioning and behavior during incarceration as well as the need for clinical treatment [35].

Female gender at mental disorders among prisoners may play an important role in providing better prison healthcare services and who needs to be concerned about. In our study, the prevalence of mental disorders is 17.82% in female prisoners and 10.56% in male prisoners. One meta-regression analysis study showed that the prevalence of mental disorders in female is higher than male around the world [35]. The notion that female are different by imprisonment is well supported in the literature. There are fewer female prisons so that female prisoners need to house in other areas further from their homes [36]. Additionally, the environment in prison is harsher on female because prison regimes and practices have been designed for male. In addition, episodic mood disorders in female prisoners are obviously more serious than male prisoners (female 4.66% vs., male 1.17%). We also found that about 1.36% male prisoners had nonpsychotic mental disorders with nondependent abuse of drugs,

mainly tobacco use disorder. The smoking rate in Taiwan was 32.5% among male and 3.3% among female in 2013 (Adult Smoking Behavior Surveillance System, ASBS). Although the government is dedicated to reducing the smoking rate, smoking is still a health issue should be noticed.

In this study, anxiety disorder was the most frequent disorder followed by persistent disorder of initiating or maintaining sleep, drug dependence and depressive disorder. After adjustment for sociodemographic characteristics, adverse health behaviors, and chronic illnesses such as cardiovascular disease, diabetes, asthma, smoking, and obesity were all significantly associated with current depressive symptoms, anxiety, and diagnosis of depression [37]. One study showed that aggression was found to relate both to the quantity and quality of sleep, with reduced quantity and quality predicted by increased overall aggression. Differences in sleep behavior before and during prison were demonstrated, with evidence for increased poor sleeping habits within detention [38]. Another study indicated that a high comorbidity of mental disorders with some symptoms or syndromes, such as anxiety and mood disorders related to drug misuse [5]. These facts pointed out the positive relationship between drug misuse and mental disorders. In addition, about depression disorders, relatives of people with depression are also at increased risk for bipolar, mania, anxiety, and posttraumatic stress disorder [39]. The findings are discussed in relationship to implications for treatment in prisons. New studies on the prevalence of mental disorders in prisons would help planners allocate funds and staff to more effectively meet the needs of these individuals [40].

We also found that prisoners with mental disorders need to get medicine services more than other prisoners. In relation to increased medical service demands in mental disorders, further work should investigate the possible contributions of the resources of mental health in the general population and the prison population, such as the closure of the provision of community care or large mental hospitals [41]. Training of prison staff and discharge planning are also important including access to medication and mental health treatment and service coordination [42].

Mental health issues rise significantly due to in an enclosed setting where prisons face adverse social circumstances and impaired future prospects [8]. Imprisonment entails a constant effort for psychosocial adaptation and we observed that some factors made a difference in suffering certain mental disorders in this Taiwanese prison population. Policy makers and practitioners should take note of the findings about the issue no matter in general population or in prison. Some studies showed that prison provided a unique public health opportunity to treat mental disorders that otherwise may be treated difficultly in the community [35]. The mental disorders are risk factors for elevated suicide rates and increased reoffending rates [43, 44]. Treatment may reduce the risks of suicide, self-harm and reoffending. According to the Agency of Corrections, Ministry of Justice, the reoffending rate was 73.3% in Taiwan in 2013. The treatment of prisoners may have a potentially large impact on public safety and public health benefits.

Methodological considerations

Using prisons population-based data could clarify the unbiased prevalence and reduce selection bias for mental disorders assessments; however, it is important to note limitations to this study. Firstly, the NHIRD dataset does not contain detailed information regarding socioeconomic status and family history of systemic diseases, all of which may be risk factors mental disorders. Secondly, the evidence derived from a cross-sectional study is generally lower in statistical quality than that from randomized trials because of potential biases related to adjustments for confounding variables. Thirdly, bias resulting from unknown confounders may still have affected the results. Fourthly, all data in the NHIRD are anonymous, that is, relevant clinical variables, such as serum laboratory data, imaging results and pathology findings were unavailable regarding the study patient cases. Finally, only 1-year study period, by clear inference, would not be able to be used to reflect long-term exposure to various demographic or factors, which might be important influencers of mental disorders. The solution to such a quandary would best be accomplished by conducting a number of perspective longitudinal analogous studies, the results of which would be expected to complement the cross-sectional findings of this study. Finally, it is difficult to explore the direction of causality for the high prevalence of mental disorders, namely whether the excess in rates is caused by prison or whether they are imported into prison in this study. Further large-scale high-quality studies with long-term follow-up are warranted for exploring whether people with mental illnesses are more likely to come into contact with the criminal justice system, or whether incarceration causes mental illness.

Conclusion

In conclusion, this study found that a substantial proportion of prisoners reported having mental disorders. The results suggest the necessity of comprehensive assessment and more programs that offer alternatives to incarceration of mental health for the criminal justice system in Taiwan.

Compliance with ethical standards

Conflict of interest I certify that all my affiliations with or financial involvement in, within the past 5 years and foreseeable future, any organization or entity with a financial interest in or financial conflict with

the subject matter or materials discussed in the manuscript are completely disclosed (e.g., employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, royalties).

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