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Illicit drug use, early age at first use and risk of premenstrual syndrome: A longitudinal study

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ABSTRACT

Background: Premenstrual syndrome (PMS) is common among women of reproductive age. Limited studies have investigated the long-term association between illicit drug use and PMS.
Methods: The 1973–1978 cohort from the Australian Longitudinal Study on Women's Health, a prospective cohort study, was followed up for 13-year from 2000 to 2012. Data were collected through self-reported questionnaires on all variables, including PMS, illicit drug use and a range of sociodemographic, lifestyle, reproductive and psychological factors.
Results: When the women were 22–27 years of age, over 40% use illicit drug in the last 12 months, 9% first used drug before age 15 years and approximately 35% reported PMS. Over the study period, the prevalence of drug use in the last 12 months declined whereas that of PMS remained fairly stable except an increase when they were 34–39 years old. Generalised estimating equations analysis showed that, compared to never drug users, significantly higher odds of reporting PMS were detected for illicit drug use in the last 12 months: multiple drugs (odds ratio (OR) 1.31, 95% confidence interval (CI) 1.21, 1.43), exclusive marijuana (OR 1.23, 95% CI 1.08, 1.40). A higher odds of PMS was identified for age at first drug use before 15 years (OR 1.20, 95% CI 1.03, 1.40).
Conclusions: Illicit drug use in the last 12 months, especially early age at first use and multiple drug use, is associated with increased risk of PMS. However current study is unable to prove causality.

1. Introduction

Up to 90% of menstruating women may experience premenstrual syndrome (PMS) (Dennerstein et al., 2012) and approximately 20% to 40% experiences moderate to severe PMS that substantially impair functioning and relationships (Halbreich et al., 2003; Rapkin and Winer, 2009). A small proportion, 3–8%, suffers from premenstrual dysphoric disorder (PMDD), a severe form of PMS (Dennerstein et al., 2012). The core emotional symptoms characterising PMS include depressed mood, anxiety, affective lability, anger or irritability, and feeling out of control; and typical physical symptoms include bloating, breast tenderness and headache (Freeman, 2003).

Compared with women without PMS, decreased work productivity, increased work absenteeism and healthcare utilisation have been reported for women with PMS, resulting in considerable economic losses (Borenstein et al., 2005; Heinemann et al., 2012). Partly due to the repeated occurrence of the symptoms, previous studies have suggested that the health-related quality-of-life burden associated with PMDD is comparable with other chronic conditions such as back pain and depressive disorders (Rapkin and Winer, 2009; Heinemann et al., 2012).

Despite a large body of literature on PMS/PMDD, few population-based longitudinal studies examined the association of PMS with potential lifestyle risk factors, especially drug use. One community study on the trend of PMDD reported on its co-existing conditions, including drug abuse, in 1488 young German women (Wittchen et al., 2002). Despite being part of a longitudinal study, the paper only reported the association in a cross-sectional nature. It detected an increased (OR 2.2), albeit not statistically significant, association between drug abuse or dependence and PMDD. However, the lack of power due to the small number of PMDD cases ($n = 74$) included in the study may be one of the explanations. Further analysis conducted by the authors revealed a significant association (OR 3.3, $p < 0.05$) between drug abuse, or dependence, and sub-threshold PMDD, defined as cases short of just one PMDD diagnostic criteria based on modified Diagnostic and Statistical

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Manual of Mental Disorders—4th Edition. Most cases lacked persistent impairment associated with premenstrual symptoms to be fully classified as PMDD (Wittchen et al., 2002).

PMS is common among Australian women affecting over a third of the women included in a study with large population sample (Ju et al., 2014); however little is known about the association between illicit drug use and PMS. The aim of this longitudinal study is to investigate the association between illicit drug use and PMS among Australian women followed over 13 years. We hypothesise that illicit drug use and early age at first use are associated with PMS.

2. Materials and methods

2.1. Population

The 1973–1978 cohort of the Australian Longitudinal Study on Women's Health (ALSWH), a prospective cohort study, formed the study population. ALSWH randomly sampled women registered on the national Medicare database, which includes almost all permanent residents in Australia. The detailed study methods have been previously reported (Brown et al., 1998). The women included in this study, who were aged 18–23 years at baseline (1996), were found to be reasonably representative of Australian women of the same age from the national census although women included in the survey were more likely to have tertiary education and less likely to be in labour force (Brown et al., 1998). Questionnaires were sent to participants every 3–4 years, with the most recent survey being conducted in 2012.

For this study, survey 1 was not included as data on illicit drug use were not collected. Therefore data over 13 years from survey 2 in 2000 to survey 6 in 2012 were used. Hereafter, baseline refers to survey 2 with 9688 women included.

ALSWH was approved by the Human Research Ethics Committee of the University of Newcastle. For this study, permission to use the data was granted from the Publications, Analyses and Substudies Committee of the ALSWH in August 2012.

2.2. Measurements

At each survey, data were collected through self-report. The presence of PMS was based on the question: 'In the last 12 months have you had premenstrual tension?' Women were considered to have had a recent history of PMS if their response was 'sometimes' or 'often', and to be symptom-free if their response was 'never' or 'rarely'.

The main exposure of interest was illicit drug use. It was measured by (1) pattern of drug use which was classified into five groups: never used, ex-exclusive marijuana use (used but not in the last 12 months), ex-multiple drug use (including multiple drugs or a single drug other than marijuana), recent exclusive marijuana use (use in the last 12 months), and recent multiple drug use; and (2) age at first drug use was categorised as never used, started < 15, 15–17 or ≥ 18 years of age. As shown in Table 2, other socio-demographic and lifestyle characteristics of the women were collected and included age, highest level of education, marital status, management on income, area of residence, language spoken at home, body mass index (BMI), smoking status, alcohol consumption and physical activity. The following reproductive and psychological characteristics were included: use of oral contraceptives, number of births (live and still), age at menarche, history of abuse (physical, emotional or sexual) and self-reported depression.

2.3. Statistical analysis

Statistical analyses were performed using SAS version 9.4 for Windows (SAS Institute, Inc., Cary, NC). Women's pattern of illicit drug use at the individual level over time was displayed at each survey using lasagne plots for longitudinal categorical variables (Jones et al., 2014). The prevalence of PMS, weighted for area of residence to correct for oversampling of women in rural and remote area, was displayed in a histogram to show the trend over time.

Baseline characteristics of the women in relation to illicit drug use and PMS status were compared using χ^2 test. The longitudinal association between illicit drug use and PMS was investigated by Generalised Estimating Equations, taking into account the repeated measures of variables over time. PMS was modelled on concurrent illicit drug use from the same survey. Univariate analysis was performed on all exposure variables mentioned above, one at a time, and those which were statistically significantly associated with PMS were entered into multivariable-adjusted models, except for some known risk factors for PMS such as education. The association of interest was examined after controlling for sociodemographic, lifestyle, reproductive and psychological factors, sequentially entered into the models in blocks of variables. Statistical significance was set at $p < 0.05$.

Two sets of sensitivity analysis were performed to test the robustness of the study results. First, the association between age at first drug use and PMS was re-examined restricting the analysis to drug users in the last 12 months to compare the results with those from the main analysis. Second, as a number of self-reported never drug users had age at first drug use recorded ($n = 558$ in survey 6, 342 in survey 5, 470 in survey 4, and 239 in survey 3), the models were rerun by recoding these women as ex-drug users to evaluate its impact on the study results.

3. Results

At baseline, about 65% of the included women reported ever use of any illicit drugs and over 40% used drugs in the last 12 months (Table 1), of which 37% were multiple drug users and 5% exclusive marijuana users (Table 3). The most commonly used drug was marijuana, with more than half of the women reporting ever use at baseline. The other more commonly used drugs were ecstasy/designer drugs, amphetamines and LSD. The mean age at first drug use was earlier for marijuana (17.2 years) than other common drugs, with 9% of the women first used any drug before 15 year of age. As shown in Table 2, women who used illicit drugs in the last 12 months were more likely to be single or separated/divorced/widowed, to smoke and be risky alcohol drinkers, and those who used multiple drug in the last 12 months were also more likely to have difficulty coping with income, to have a history of abuse, and to feel depressed. Over the study period, a decreased proportion of women reported use of any illicit drugs in the last 12

Table 1
Ever and recent illicit drug use in 2000 among women from the 1973–1978 Cohort of the Australian Longitudinal Study on Women's Health ($n = 9518$).

	Percentage[a]		Mean age at first use (years)
	Ever used	Recent use[b]	
Marijuana	56.7	24.4	17.2
Ecstasy/designer drugs	14.5	9.2	20.8
Amphetamines	16.4	8.5	19.6
LSD	14.0	3.1	18.7
Cocaine	6.0	2.8	21.1
Hallucinogens	5.0	0.8	18.6
Tranquillizers	5.0	1.9	19.9
Inhalants	1.8	0.3	16.2
Heroin	1.2	0.4	19.9
Any illicit drug	65.3	43.5	

[a] Weighted for area of residence.
[b] Use of illicit drugs in the last 12 months.