RESEARCH LETTER

Alcohol, Cigarette, and Cannabis Use Between 2002 and 2016 in Pregnant Women From a Nationally Representative Sample

In the National Survey of Drug Use and Health, the adjusted prevalence of past 30-day cannabis use in pregnant women aged 18 to 44 years rose from 2.37% in 2002 to 3.85% in 2014.1 Another study found a relatively similar increase from 4.2% in 2009 to 7.1% in 2014.2 Corresponding rates of alcohol use (eg, 11.2% from 2001-2005 vs 10.2% from 2011-2013) and cigarette smoking (eg, 13.3% in 2002 vs 12.3% in 2010) during pregnancy have generally decreased.3-5 These reports encourage more detailed characterization of patterns of substance use during the course of pregnancy.

Methods | We used National Survey of Drug Use and Health data from 2002 to 2016 to identify changes in alcohol, cigarette, and cannabis use during pregnancy in women aged 18 to 44 years and identify demographic groups (ie, age, race, educational level) and trimesters of pregnancy where changes might be more apparent. Analyses were conducted using generalized linear models with adjustments for survey features in Stata, version 15 (StataCorp). Bonferroni correction for 27 tests was applied, with significance established at \( P = .002 \), using 2-tailed, unpaired testing. The Washington University School of Medicine approved the study with waiver of informed consent.

Results | Of 12,988 pregnant women (n = 436,056 women), only those aged 18 to 25 years (n = 8,170) or 26 to 44 years (n = 3,888) were retained in analyses. Of these 12,058 women, 3,554 women reported being in their first trimester of pregnancy. The 2002 survey-adjusted prevalence of alcohol, cigarette, and cannabis use during pregnancy was 9.59%, 17.5%, and 2.85%, respectively. By 2016, these adjusted prevalence estimates were 8.43%, 10.34%, and 4.98%, respectively. A decline in cigarette smoking during pregnancy was noted (Figure) (odds ratio [OR] per year, 0.97; 95% CI, 0.96-0.98; \( P < .001 \)). Although not statistically significant, similar decreases in any alcohol use during pregnancy were also noted (OR, 0.98; 95% CI, 0.96-1.00; \( P = .06 \)). In contrast and consistent with a prior National Survey of Drug Use and Health report that used data from 2002 to 2014, a slight increase was noted for cannabis use during the past 30 days in pregnant women (OR, 1.03; 95% CI, 1.00-1.05; \( P = .048 \)). The prevalences for cannabis use during pregnancy reported here differ slightly from those reported by Brown et al.1 We adjusted our estimates for complex survey features, while Brown and colleagues1 adjusted for a variety of sociodemographic characteristics in a log Poisson setting. There was also a significant decline in co-use of alcohol and cigarettes (OR, 0.94; 95% CI, 0.91-0.97; \( P = .001 \)).

Results in key demographic groups are reported in the Table. For alcohol use during pregnancy, the decrease was most evident in women aged 18 to 25 years (OR, 0.98 [95% CI, 0.95-1.00]; \( P = .02 \)). For cigarette smoking during pregnancy, decreases were significant in white women (OR, 0.97 [95% CI, 0.95-0.98]; \( P < .001 \)), those aged 18 to 25 years (OR, 0.97 [95% CI, 0.95-0.98]; \( P < .001 \)), and in those reporting high school completion or higher educational levels (OR, 0.97 [95% CI, 0.96-0.99]; \( P < .001 \)). In contrast, cannabis use showed nominal increases in pregnant women who had completed high school (OR, 1.04 [95% CI, 1.01-1.08]; \( P = .02 \)). While sample sizes when stratified by trimester were modest, reductions in cigarette smoking were evident in both the first trimester (OR, 0.98 [95% CI, 0.96-0.99]; \( P = .009 \)) and, significantly, later into pregnancy (OR, 0.97 [95% CI, 0.95-0.99]; \( P < .001 \)). For alco-

Figure. Past 30-Day Alcohol Use, Cigarette Smoking, and Cannabis Use in 12,058 Pregnant Women Aged 18 to 44 Years

Adjusted prevalence (adjustment for survey features only) shown as point estimate; error bars indicate 95% CI. Linear movement shown as dotted line.

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### Table. OR per Year Indicating Strength of Increases and Decreases in Prenatal Alcohol, Cigarette, and Cannabis Use in Pregnant Women Aged 18 to 44 Years in 2002-2016 Data From the NSDUH

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No.</th>
<th>OR (95% CI) Alcohol</th>
<th>OR (95% CI) Cigarettes</th>
<th>OR (95% CI) Cannabis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>12058</td>
<td>0.98 (0.96-1.00)</td>
<td>0.97 (0.96-0.98)</td>
<td>1.03 (1.00-1.05)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>6761</td>
<td>0.98 (0.96-1.01)</td>
<td>0.97 (0.95-0.98)</td>
<td>1.02 (0.98-1.06)</td>
</tr>
<tr>
<td>Black</td>
<td>1861</td>
<td>0.99 (0.96-1.03)</td>
<td>0.99 (0.96-1.02)</td>
<td>1.04 (0.99-1.09)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>8170</td>
<td>0.98 (0.95-1.00)</td>
<td>0.97 (0.95-0.98)</td>
<td>1.02 (0.99-1.05)</td>
</tr>
<tr>
<td>26-44</td>
<td>3888</td>
<td>0.99 (0.96-1.01)</td>
<td>0.99 (0.96-1.01)</td>
<td>1.06 (0.99-1.12)</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;High school</td>
<td>2597</td>
<td>0.98 (0.94-1.02)</td>
<td>0.99 (0.97-1.01)</td>
<td>1.00 (0.95-1.06)</td>
</tr>
<tr>
<td>≥High school</td>
<td>9461</td>
<td>0.98 (0.96-1.00)</td>
<td>0.97 (0.96-0.99)</td>
<td>1.04 (1.01-1.08)</td>
</tr>
<tr>
<td>Trimester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>3554</td>
<td>1.00 (0.97-1.02)</td>
<td>0.98 (0.96-0.99)</td>
<td>1.04 (1.01-1.08)</td>
</tr>
<tr>
<td>Second or third</td>
<td>8407</td>
<td>0.96 (0.93-0.99)</td>
<td>0.97 (0.95-0.99)</td>
<td>1.00 (0.97-1.04)</td>
</tr>
</tbody>
</table>

Abbreviations: NSDUH, National Survey of Drug Use and Health; OR, odds ratio.

* P = .002, Bonferroni corrected for 27 tests (9 tests for 3 substances, ie, full sample and all subgroups).

* P = .05.

* Not significant but within 95% CI of significant estimate in a related group.

Discussion | Unlike alcohol and cigarette use, prenatal cannabis use has not decreased, especially during the first trimester of pregnancy, which is a key phase of neural development for the fetus. Study limitations include underreporting associated with self-report, although some concerns are mitigated by prenatal use being extrapolated from independent items assessing pregnancy status and substance use. Also, some subgroup analyses relied on small sample sizes, although they provided some insights. For instance, black women, those aged 26 to 44 years, and those with less than a high school education did not show a significant decrease in prenatal cigarette smoking. Furthermore, and despite the reduced sample size, the significant decrease in prenatal cigarette smoking past the first trimester was encouraging, as is the general decline in cigarette smoking in nonpregnant women. Few subgroup differences were apparent for cannabis use. Greater public awareness regarding the consequences of prenatal cannabis exposure in offspring health is necessary.

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