Poster # 875

Steady Decline: Temporal Changes in Substance Use by HIV Positive Pregnant Women in the US

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BACKGROUND

- Approximately 8,700 HIV-infected women give birth in the United States each year.[1]
- Rates of substance use in this population have historically been quite high; in the late 1980s and early 1990s, approximately half of HIV-infected pregnant women used illicit substances.[2,3]
- Substance use during pregnancy in HIV-infected women has serious implications for transmission, infant outcomes, and maternal outcomes.
- In the United States, the route of HIV acquisition among women has gradually shifted from injection drug use to heterosexual contact.[4,5]
- To our knowledge, no studies have examined substance use patterns in HIV-infected pregnant women over the last two decades.

OBJECTIVES

The objectives of this study are:

- To describe temporal trends in substance use during pregnancy among HIV-positive women from 1990 to 2012
- To explore possible explanations for temporal changes
- To compare the prevalence of substance use during pregnancy in our study population to pregnant women in the general US population

METHODS

Study Population

- Data come from two US-based cohort studies of HIV-infected women and their infants: the Women and Infants Transmission Study (WITS) and Surveillance Monitoring for ART Toxicities Study (SMARTT).
- Written informed consent was obtained from each participating woman, and all study sites received institutional review board approval.

Definitions and Statistical Methods

- We included women who gave birth from January 1, 1990 to December 31, 2012 in WITS or SMARTT and had available self-reported substance use information.
- Women were classified as using a substance during pregnancy if they either self-reported or had a positive biological sample (urine in WITS and meconium in SMARTT) for tobacco, alcohol, marijuana, cocaine, or heroin.
- Log binomial generalized estimating equation (GEE) models were used to test whether the prevalence of substance use during pregnancy changed over time.
- To describe the maternal characteristics associated with substance use, we fit multivariable logistic GEE models for two time periods: the pre-HAART era (1990-1995) and HAART era (1996-2012).
- A secondary analysis was restricted to women who had multiple pregnancies under observation. Log binomial GEE models were used to test whether the risk of substance use decreased with successive pregnancies.
- We graphically compared substance use prevalence in WITS/SMARTT to prevalence among pregnant women participating in the National Survey on Drug Use and Health (NSDUH), by calendar year.

RESULTS

Table 1. Maternal Characteristics for Eligible Pregnancies

	n	%
Race/ethnicity		
Non-Hispanic black	2,974	54.6
Hispanic	1,734	31.8
Non-Hispanic white	657	12.1
Not available	86	1.6
Age		
15-21	820	15.0
22-34	3,681	67.5
35-47	786	14.4
Not available	164	3.0
Education		
Less than high school	2,107	38.7
High school grad or above	3,292	60.4
Not available	52	1.0
Yearly household income		
Less than $20,000	3,929	72.1
$20,000-$40,000	738	13.5
$40,000 or more	248	4.5
Not available	536	9.8
Marital status		
Married	1,409	25.8
Unmarried	4,007	73.5
Not available	35	0.6
HIV diagnosis during pregnancy		
Diagnosed before pregnancy	3,265	59.9
Diagnosed during pregnancy	1,329	24.4
Not available	857	15.7
CD4 count		
200 or fewer	707	13.0
201-350	1,210	22.2
351-500	1,260	23.1
More than 500	2,104	38.6
Not available	170	3.1
HIV RNA (copies/mL)		
400 or fewer	1,650	30.3
401-10,000	1,899	34.8
More than 10,000	1,655	30.4
Not available	247	4.5
ART use during pregnancy		
No ART	805	14.8
AZT monotherapy	1,020	18.7
Other ART regimen	599	11.0
HAART	2,977	54.6
Not available	50	0.9

Figure 2. Prevalence of Substance Use During Pregnancy in WITS/SMARTT and NSDUH, by Year

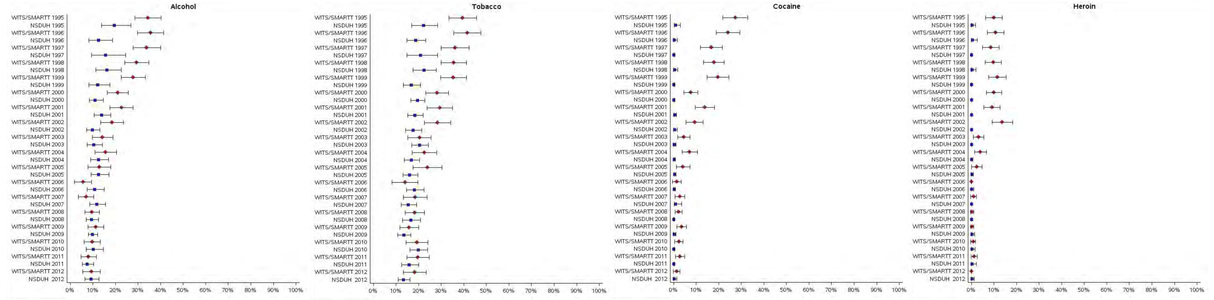

Figure 1. Proportion of WITS/SMARTT Participants Using Substances During Pregnancy, by Delivery Year (N = 5,451)

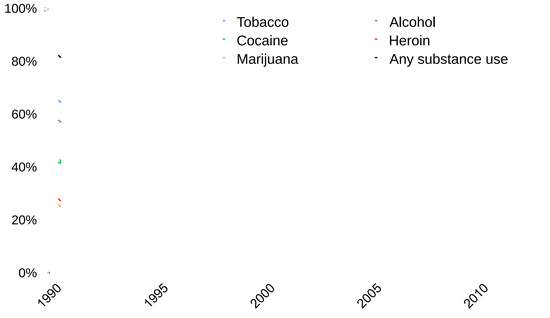

Table 2. Association Between Maternal Characteristics and Substance Use During Pregnancy in the Pre-HAART and HAART Eras

	Pre-HAART era (N = 1,093)				HAART era (N = 3,754)			
	n	% using substances	Odds Ratio	95% CI	n	% using substances	Odds Ratio	95% CI
Race/ethnicity								
Non-Hispanic black	460	69.4	0.42	0.27-0.66	2,184	34.9	0.34	0.27-0.44
Hispanic	414	65.5	0.38	0.24-0.59	1,185	34.9	0.32	0.25-0.41
Non-Hispanic white	219	83.6	Ref		385	60.0	Ref	
Age								
15-21	146	48.0	Ref		590	32.4	Ref	
22-34	828	73.9	3.97	2.60-6.05	2,554	37.7	1.57	1.28-1.93
35-47	119	76.5	5.16	2.82-9.44	610	41.5	1.99	1.54-2.58
Education								
Less than high school	508	78.7	2.40	1.76-3.28	1,362	43.4	1.35	1.16-1.57
High school grad or above	585	63.8	Ref		2,392	34.1	Ref	
Yearly household income								
Less than $20,000	885	71.0	Ref		2,610	40.3	Ref	
$20,000-$40,000	79	62.0	0.84	0.51-1.37	589	28.9	0.77	0.63-0.94
$40,000 or more	21	66.7	0.83	0.31-2.28	208	29.8	0.83	0.59-1.17
Not available	108	75.9	1.12	0.70-1.81	347	35.7	0.86	0.68-1.09
Marital status								
Married	303	61.7	Ref		965	27.6	Ref	
Unmarried	790	74.2	1.71	1.23-2.36	2,789	40.9	1.96	1.65-2.34
HIV diagnosis during pregnancy								
Diagnosed before pregnancy	677	75.8	Ref		753	40.6	Ref	
Diagnosed during pregnancy	416	62.5	0.58	0.44-0.77	2,234	40.8	0.90	0.75-1.08
Not available	n/a	--	n/a	--	767	24.8	0.56	0.47-0.66
CD4 count								
200 or fewer	150	66.7	0.63	0.40-0.99	504	38.3	0.99	0.78-1.24
201-350	240	70.8	0.79	0.53-1.17	864	37.3	0.99	0.82-1.19
351-500	264	70.5	0.87	0.61-1.25	878	37.2	0.99	0.83-1.18
More than 500	439	72.2	Ref		1,508	37.5	Ref	
HIV RNA (copies/mL)								
400 or fewer	88	67.1	Ref		1,453	33.4	Ref	
401-10,000	462	71.7	1.22	0.70-2.10	1,297	39.3	1.20	1.02-1.41
More than 10,000	543	70.5	1.19	0.68-2.09	1,004	41.0	1.30	1.07-1.58
ART use during pregnancy								
No ART	533	73.9	1.42	1.07-1.88	89	56.2	2.10	1.42-3.09
Any ART	560	67.7	Ref		n/a	--	n/a	--
AZT monotherapy	n/a	--	n/a	--	378	61.4	2.42	1.90-3.07
Other ART regimen	n/a	--	n/a	--	509	41.3	1.35	1.12-1.64
HAART	n/a	--	n/a	--	2,778	32.9	Ref	

Results Summary

- A total of 5,451 pregnancies from 4,408 women were eligible for this analysis (Table 1).
- Over 80% of women reported substance use during pregnancy in 1990, compared to 23% in 2012 (Figure 1). Risk of substance use among HIV-infected pregnant women decreased by an average of 6% per year (RR, 0.94; 95% CI, 0.94-0.95). Decreases for each substance were highly statistically significant (p<0.001 for each substance).
- Multivariable models showed that non-Hispanic white race, older age, less education, being unmarried, and not receiving ART were statistically significantly associated with substance use during pregnancy in both the pre-HAART and HAART eras (Table 2).
- Among women with multiple pregnancies, risk of substance use did not differ between earlier and later pregnancies for most substances (Table 3).

Table 3. Risk Ratios of Substance Use in Later Pregnancies Compared First In-Study Pregnancy

	N	Risk Ratio	95% CI	p-value
Tobacco	1,864	1.02	0.96-1.09	0.50
Alcohol	1,867	0.91	0.82-1.00	0.04
Marijuana	1,848	0.93	0.82-1.07	0.32
Cocaine	1,848	0.92	0.82-1.04	0.20
Heroin	1,848	1.18	0.95-1.45	0.13
Any substance	1,849	1.01	0.96-1.07	0.64
Poly-substance	1,867	0.97	0.90-1.05	0.51
Injection drug use	1,803	0.72	0.50-1.03	0.07

- Women who used a substance in their previous pregnancy were at an elevated risk of using a substance during their next pregnancy (RR, 5.71; 95% CI, 4.63-7.05).
- By the mid-2000s, prevalence of alcohol, tobacco, cocaine, and heroin use during pregnancy by women in WITS and SMARTT appeared comparable to that of the general population (Figure 2).

LIMITATIONS

- Different types of biological specimens were used to confirm self-reported substance use in the two cohort studies (urine in WITS and meconium in SMARTT).
- Only 22% of SMARTT participants had meconium samples that were tested for substance use.
- Two sensitivity analyses were performed to ensure our findings were robust to differences in specimen types and collection procedures. The first included pregnancies from WITS only, and the second included pregnancies from SMARTT with available meconium information along with WITS pregnancies. Both analyses produced estimates comparable to those found in the main analysis.

CONCLUSIONS

- A substantial decrease in substance use during pregnancy was observed between 1990 and 2012 in two large US-based cohorts of HIV-infected women.
- By the mid-2000s, substance use prevalence in pregnant HIV-infected women was similar to that of pregnant women in the general US population.
- This observed decrease is not explained by the cessation of substance use in women who had multiple pregnancies under study observation. Instead, the decrease may be due to the HIV/AIDS epidemic in the United States becoming more generalized in women in recent years.
- The finding that substance use during pregnancy has historically been associated with lack of antiretroviral use is concerning and may warrant further investigation.
- Because HIV-infected women who used substances in past pregnancies are at five-fold increased risk of use during future pregnancies, they may be important to target in efforts to further reduce substance use in this population.

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