Trends in Oral Contraceptive Use and Cigarette Smoking

Behavioral Risk Factor Surveillance System, 1982 and 1988

Drue H. Barrett, PhD; Robert F. Anda, MD, MS; Luis G. Escobedo, MD, MPH; Janet B. Croft, PhD; David F. Williamson, PhD, MS; James S. Marks, MD

Objective: To investigate trends in oral contraceptive (OC) use and smoking among women of reproductive age and to determine factors related to smoking among OC users.

Design, Setting, and Participants: Telephone interviews of women aged 18 through 45 years in 16 states and the District of Columbia who participated in the Behavioral Risk Factor Surveillance System in 1982 (N=3553) and in 1988 (N=7384).

Results: Between 1982 and 1988, the prevalence of smoking decreased from 31% to 24% among OC users and from 32% to 28% among non-OC users. In both 1982 and 1988, more than half of the OC users who smoked were heavy smokers (smoked 15 or more cigarettes per day). Nearly one fourth of 35- to 45-year-old women who used OCs were smokers. After we standardized for age, race, and education, the decline in the prevalence of smoking among OC users did not differ substantially from the decline in smoking among non-OC users.

Conclusions: Despite the possible synergistic effects of smoking and OC use on the risk of cardiovascular disease, we found no accelerated decline in the prevalence of smoking among OC users. As of 1988, nearly one fourth of all OC users were smokers. These data emphasize the need to reduce the prevalence of smoking among women who use OCs before they reach the age at which their risk for cardiovascular disease increases substantially.

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From the Cardiovascular Health Studies Branch, Division of Chronic Disease Control and Community Intervention (Drs Barrett, Anda, Escobedo, and Croft), the Chronic Disease Prevention Branch, Division of Nutrition (Dr Williamson), and the Division of Reproductive Health (Dr Marks), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Ga.

SMOKING HAS been reported to increase the risk of myocardial infarction,[1-5] stroke,[6-8] and thromboembolic disease[6] among women who use oral contraceptives (OCs), especially among women older than 35 years. In fact, it has been suggested that clinicians consider smoking to be a contraindication to OC use for women older than 35 years,[9] and manufacturers of OCs include package inserts that urge women who use OCs not to smoke.

Although the risk of cardiovascular disease (CVD) among younger women may be lower than that among women older than 35 years,[1] health care providers should urge younger OC users to quit smoking before they reach the age at which the combined use of cigarettes and OCs clearly puts them at increased risk for CVD. This is important because many smokers are successful at quitting only after multiple attempts,[10] and effective counseling about smoking cessation should include repeated and consistent advice to quit.[11]

Despite several decades of decline in the prevalence of smoking, 22.2 million American women (23.5%) smoked in 1991, with the prevalence of current smoking highest among those aged 25 to 44 years (28%).[12] To determine if recent declines in the prevalence of smoking have been greater among women who use OCs than among non-OC users and to describe factors associated with smoking among women who use OCs, we analyzed data on smoking and OC use from the 1982 and 1988 Behavioral Risk Factor Surveillance System (BRFSS).

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SUBJECTS AND METHODS

The BRFSS was designed to provide state-specific estimates of the prevalence of behavioral factors associated with health outcomes.[13] Nineteen states and the District of Columbia collected behavioral data in both 1982 and in 1988. These states represented all geographic regions of the United States. All but three states (Alabama, Montana, and Ohio) questioned 18- to 45-year-old women about current use of OCs. We aggregated the data from these 16 states and the District of Columbia; the aggregated sample included 4659 women in 1982 and 8298 women in 1988.

In both the 1982 and 1988 surveys, an independent probability sample of households with telephones in the noninstitutionalized, civilian population was selected using a multistage cluster-sampling design.[14] Although the questionnaire differed somewhat between the 2 survey years, the questions about smoking and OC use were identical. A detailed technical description of the methods used by the BRFSS has been presented elsewhere.[13]

Only 18- to 45-year-old women with complete demographic information and complete data on OC use, smoking status, and selected behaviors or conditions associated with smoking or an increased risk of CVD (including binge drinking, hypertension, and overweight) were included in the analyses. Thus, we included 3553 (76%) of the women from the 1982 sample and 7384 (89%) of the women from the 1988 sample.

We defined women as current smokers if they reported smoking 100 or more cigarettes during their lifetime and if they stated that they currently smoked. As suggested in guidelines to clinicians prescribing OCs,[9] women who reported smoking 15 or more cigarettes per day were defined as heavy smokers. We defined binge drinking as having consumed five or more drinks on at least one occasion during the previous month. Women who had been told by a physician that they had high blood pressure were defined as being hypertensive. Overweight was defined as a body mass index (self-reported weight in kilograms divided by self-reported height in meters squared) of 27.3 kg/m^2 or greater, a value that represents the 85th percentile of body mass index for 20- to 29-year-old women as estimated from the second National Health and Nutrition Examination Survey.[15]

We calculated both crude and age-, race-, and education-standardized prevalence of smoking among OC users and non-OC users for the 1982 and 1988 samples. The referent group for the standardized estimates were women aged 18 to 44 years from the 1980 census. The referent for race was based on a comparison of black and white women; thus, Hispanic women were excluded from calculation of the standardized estimates.

We used a statistical software package (SESUDAAN[16]) for analysis of complex sample survey data to compute the prevalence estimates and 95% confidence intervals (CIs). We used multivariate logistic regression analysis (RTILOGIT[17]) to assess the relationship between smoking and other risk behaviors and health conditions among OC users. These factors included age (18 to 24 years, 25 to 34 years, and 35 to 45 years), education (less than 12 years of school, high school graduate, and more than 12 years of school), race (white, black, and Hispanic), survey year (1982, 1988), binge drinking, history of hypertension, and overweight status. Among OC users who smoked, we also examined the relationship between heavy smoking and these risk behaviors and health conditions.

RESULTS

OC USE AND SMOKING

The prevalence of OC use among 18- to 45-year-old women was 19% in both the 1982 and 1988 surveys. However, among all women surveyed, the prevalence of current smoking decreased by five percentage points, from 32% in 1982 to 27% in 1988.

The prevalence of OC use by age, race, education, and current smoking status was similar in 1982 and 1988 (**Table 1**). However, the prevalence of OC use was higher among women aged 25 to 34 years in 1988 than in 1982.

The prevalence of current cigarette smoking in 1988 decreased from 1982 levels among all age and racial groups. The largest declines were among 35- to 45-year-old women and among black women (Table 1). Although the prevalence of smoking decreased among women with 12 or more years of education, it did not change among women with less than 12 years of education.

The prevalence of current smoking among OC users decreased from 31% in 1982 to 24% in 1988 and from 32% in 1982 to 28% in 1988 among non-OC users (Table 1). After standardizing for age, race, and education, the decline in the prevalence of smoking among OC users (−8%) did not differ substantially from the decline in smoking among non-OC users (−5%) (**Figure**). When we used logistic regression analysis to adjust for age, race, education, binge drinking, hypertension, and overweight status, OC users in 1988 were about equally as likely to be current smokers as were OC users in 1982 (adjusted odds ratio [OR], 0.9; 95% CI, 0.6 to 1.2) (**Table 2**).

FACTORS ASSOCIATED WITH SMOKING AMONG OC USERS

Several demographic variables were associated with smoking among OC users (Table 2). The prevalence of smoking among OC users was highest among women aged 18 to 24 years (29%). However, nearly one fourth of OC users aged 35 to 45 years reported that they

Table 1. Prevalence of Oral Contraceptive (OC) Use and Current Smoking Status Among Women Aged 18 to 45 Years by Demographic Characteristics and Year of Survey

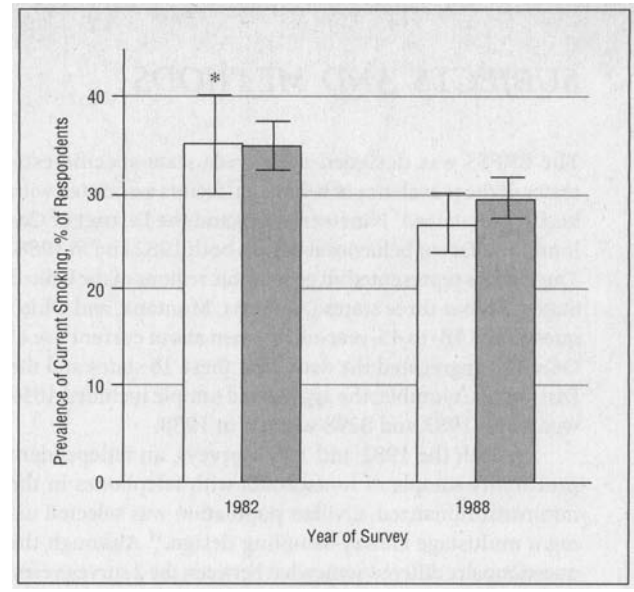
Characteristic	Women Who Use OCs, %		Women Who Smoke, %	
	1982 Survey	1988 Survey	1982 Survey	1988 Survey
Age, y				
18-24	36.2	35.4	28.5	23.5
25-34	17.9	23.2	31.7	28.7
35-45	3.9	3.2	36.0	27.8
Race				
White	19.0	19.1	33.1	29.9
Black	21.1	18.1	31.4	20.2
Hispanic	20.2	20.9	22.1	15.9
Education, y				
>12	19.9	19.4	24.6	20.6
12	20.1	20.3	38.6	32.1
<12	15.2	14.1	41.8	42.1
OC user				
No	...	...	32.4	27.2
Yes	...	...	30.5	24.0
Current smoker				
No	18.8	20.0	...	...
Yes	18.4	17.1	...	...

smoked; after we adjusted for covariates, older OC users were as likely to be smokers as their younger peers. Black and Hispanic women who used OCs were less likely to be smokers than were white OC users. Oral contraceptive users with less than 12 years of education were almost four times more likely to be smokers than OC users with education beyond high school; OC users with 12 years of education were about two times more likely to be smokers than their more educated peers.

The prevalence of smoking among OC users who binge drank was 44%. After adjusting for other factors, OC users who binge drank were three times more likely to smoke cigarettes than OC users who did not. The prevalence of smoking among OC users who had been told by a physician that they had high blood pressure was 35%. After adjusting for other variables, OC users with hypertension were slightly more likely to be current smokers than were those without hypertension. We found no substantial relationship between being overweight and smoking among OC users.

HEAVY SMOKING AMONG OC USERS WHO SMOKE

The prevalence of heavy smoking among OC users who smoke did not change substantially between the 1982 and 1988 surveys; in each survey year, more than half of the OC users who were smokers reported



Prevalence of smoking adjusted for age, race, and education by oral contraceptive (OC) use and year of survey. Open bars indicate OC users; shaded bars, non-OC users; and asterisk, 95% confidence interval.

that they smoked heavily (**Table 3**). When we used logistic regression analysis to adjust for age, race, education, binge drinking, hypertension, and overweight status, women who used OCs and smoked in 1988 were less likely to be heavy smokers than were women who used OCs and smoked in 1982; however, this difference was not statistically significant (adjusted OR, 0.8; 95% CI, 0.4 to 1.3).

Age, race, and education were associated with heavy smoking among OC users who smoked (Table 3). The highest prevalence of heavy smoking among OC users was among smokers in the 35- to 45-year-old age group. These women were at least twice as likely to be heavy smokers as younger women. A test for trend showed that increasing age was associated with increasing odds of being a heavy smoker among OC users who smoked ($P<.001$).

Black and Hispanic women who used OCs and smoked were less likely to be heavy smokers than were white OC users who smoked (Table 3). Women with less than 12 years of education were almost three times more likely to be heavy smokers than were their more educated peers. Finally, binge drinking and hypertension were associated with decreased odds of heavy smoking, whereas being overweight was associated with increased odds of heavy smoking among these women. The precision of these estimates, however, was low.

COMMENT

Despite the possible synergistic effects of smoking and OC use on the risk of CVD, the decline in the prevalence of smoking was not substantially greater among

Table 2. Prevalence and Relative Odds of Smoking Among Oral Contraceptive (OC) Users by Year of Survey, Demographic Characteristics, and Risk Factors

Characteristic	No. of Respondents (n=2090)	OC Users Who Smoke, %	Crude Prevalence Ratio	Adjusted Odds Ratio*	95% Confidence Interval
Year of survey					
1982	645	30.5	1.0	1.0	Referent
1988	1445	24.0	0.8	0.9	0.6-1.2
Age, y					
18-24	864	28.6	1.0	1.0	Referent
25-34	1075	24.9	0.9	1.1	0.8-1.6
35-45	151	24.3	0.8	1.1	0.6-2.0
Race					
White	1648	30.0	1.0	1.0	Referent
Black	253	18.1	0.6	0.6	0.3-0.9
Hispanic	189	14.0	0.5	0.3	0.1-0.7
Education, y					
>12	1142	19.9	1.0	1.0	Referent
12	773	33.7	1.7	2.3	1.6-3.3
<12	175	38.3	1.9	3.7	2.1-6.7
Binge drinker					
No	1672	21.7	1.0	1.0	Referent
Yes	418	44.0	2.0	3.0	2.1-4.3
Hypertension					
No	1926	26.1	1.0	1.0	Referent
Yes	164	34.9	1.3	1.4	0.8-2.6
Overweight					
No	1946	27.1	1.0	1.0	Referent
Yes	141	23.0	0.8	0.9	0.5-1.7

**Each variable was adjusted for the other variables listed.*

women who used OCs than among women who did not; furthermore, among OC users who smoked, we found no evidence of a decline in heavy smoking. As of 1988, nearly one fourth of all OC users were smokers and many of the OC users at highest risk, those aged 35 and older, continued to be heavy smokers. Although younger women may be at lower risk for CVD than older women,[1] it is important to reduce the prevalence of smoking among women who use OCs before they reach the age at which their risk for CVD increases substantially.

The absence of an accelerated decrease in smoking among OC users since 1982 may be due to multiple factors. First, physicians may not be taking full advantage of opportunities to assist women who use OCs to quit smoking. In fact, a survey of Michigan residents in the early 1980s found that only 46% of female smokers had been told by a physician to quit smoking and women who used OCs were no more likely to have been advised to quit than non-OC users.[18] Similarly, data from the Stanford Five-City Project collected between 1979 and 1990 found that only 44% of OC users who smoked had been counseled to stop smoking.[19] Thus, additional efforts are needed to ensure that every OC user who smokes receives consistent and effective counseling about smoking cessation.

Health care providers may place less emphasis on smoking cessation among younger OC users. However, smokers often quit after multiple attempts[10] and the effectiveness of cessation counseling is maximized by providing repeated and consistent advice to quit.[11] Therefore, intensive smoking-cessation efforts need to include younger OC users to maximize their likelihood of quitting before age 35 years.

Another reason for the lack of an accelerated decline in smoking among OC users may involve OC-prescribing practices and balancing the risks of pregnancy against the risk of smoking-related CVD. A

many of the OC users at highest risk, those aged 35 and older, continued to be heavy smokers

1986 *Contraceptive Technology Update* survey[20] reported that 95% of clinicians would prescribe OCs to a healthy 20-year-old woman who smoked one pack of cigarettes per day. The rationale for recommending

Table 3. Prevalence and Relative Odds of Heavy Smoking Among Oral Contraceptive (OC) Users Who Smoke by Year of Survey, Demographic Characteristics, and Risk Factors

Characteristic	No. of Reespondents (n=593)	Heavy Smokers, % of OC Users Who Smoke	Crude Prevalence Ratio	Adjusted Odds Ratio*	95% Confidence Interval
Year of survey					
1982	204	56.9	1.0	1.0	Referent
1988	389	53.1	0.9	0.8	0.4-1.3
Age, y					
18-24	256	45.9	1.0	1.0	Referent
25-34	297	63.9	1.4	2.3	1.3-4.0
35-45	40	85.3	1.9	12.5	3.0-51.8
Race					
White	509	59.1	1.0	1.0	Referent
Black	59	43.5	0.7	0.3	0.1-0.6
Hispanic	25	10.7	0.2	0.1	0.0-0.2
Education, y					
>12	244	47.3	1.0	1.0	Referent
12	273	58.3	1.2	1.7	0.9-3.1
<12	76	65.8	1.4	2.8	1.1-6.7
Binge drinker					
No	406	60.6	1.0	1.0	Referent
Yes	187	45.8	0.8	0.6	0.3-1.1
Hypertension					
No	538	55.8	1.0	1.0	Referent
Yes	55	48.1	0.9	0.7	0.3-1.8
Overweight					
No	556	54.4	1.0	1.0	Referent
Yes	37	65.2	1.2	2.0	0.8-4.7

**Each variable was adjusted for the other variables listed.*

OC use to women who smoke is that the risk of death from pregnancy is greater than the risk of death from combined smoking and OC use in younger women.[9] Thus, the practice has been to prescribe OCs to smokers with the caveat that they are strongly encouraged to stop smoking or to cut back. However, the lack of an accelerated decline in smoking and continued heavy smoking among OC users suggest that current practices regarding the treatment of younger OC users who smoke have not been effective.

Because of the age-related increase in risk for CVD, we are especially concerned about the age-related increase in the prevalence of heavy smoking among OC users who smoke. We are also concerned about the high prevalence of smoking among less educated OC users as well as their greater likelihood of being heavy smokers. Among less educated women, the prevalence of OC use may be increasing[21] while the prevalence of smoking is declining less rapidly.[22] These two trends are likely to contribute to an increased risk of CVD among less educated women. Finally, more than one third of OC users with hypertension were current smokers, which may place these women at especially high risk for CVD.

Because alcohol use and smoking are strongly related,[23] we were not surprised to find that binge drinking was also associated with smoking among OC users. We were unable to make comparisons between OC use and smoking while adjusting for the amount of alcohol consumed owing to differences in questions about alcohol consumption in the 1982 and 1988 surveys. However, binge drinking may be an indicator of risk-taking behavior among young women.

age-related increase in the prevalence of heavy smoking among OC users

We considered several potential sources of bias in our prevalence estimates. While OC use is typically reported accurately,[24] cigarette smoking is often underreported.[25] Because the BRFSS excludes households without telephones, young women of lower socioeconomic status are underrepresented and these women have a higher prevalence of smoking. Thus, the prevalence of smoking among OC users is probably higher than our estimates indicate.

The lack of progress in smoking cessation and reducing the number of cigarettes smoked among OC users is discouraging. As of 1988, many of the OC users at highest risk for CVD, ie, those aged 35 years and older,

continue to be heavy smokers. In addition, among younger OC users, it is important to reduce the prevalence of smoking before they reach the age at which their risk for CVD increases substantially.

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Reprint requests to Centers for Disease Control and Prevention, 4770 Bufford Hwy NE, Mailstop K-47, Atlanta, GA 30341-3724 (Dr Barrett).

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