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Smoking Habits of Oil Refinery Employees

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Abstract: Smoking habits of White male employees of a large oil company were analyzed. There were only slight differences in smoking habits between refinery and nonrefinery employees. Salaried employees, both at refineries and elsewhere, smoked much less than hourly employees. (*Am J Public Health* 1984; 74:1408–1409.)

Introduction

Recent epidemiologic studies of the mortality of oil refinery workers have reported low Standardized Mortality Ratios (SMRs) for lung cancer and other cancers linked to cigarette smoking.[1,2] A suggested explanation is that refinery employees do not smoke because of the obvious danger of, and prohibition against, smoking in many refinery areas. To evaluate this hypothesis, we analyzed data from employees of a large petrochemical company, Standard Oil Company (Indiana), and compared smoking habits of White males who worked in oil refineries with those of nonrefinery White males.

Materials and Methods

A study file of employee smoking habits was created by extracting smoking question responses and demographic information from a computerized medical department data base which contains records of all employee initial and periodic health examinations done between January 1, 1976 and February 15, 1983. The most recent examination containing smoking information was used; about 75 per cent of these were done in 1980–83. Demographic information included birth date, sex, race, employment type (whether on an hourly wage or salaried), and a location code which designated whether the employee worked in a refinery. Age was calculated as of the date of the health examination which included the smoking history.

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The smoking history was used to place each employee in one of four mutually exclusive categories (short titles for the categories are in parentheses): current cigarette smoker (current), never smoker (never), former cigarette smoker (ex-smoker), and pipe and cigar smokers (other). Pack-years for current and ex-smokers were calculated by multiplying the number of packs of cigarettes smoked per day by years of smoking.

Age adjustment was by direct standardization using the total hourly and total salaried populations as standards (Table 1). Analysis of covariance was used to calculate and compare age-adjusted pack-years.

Results

Smoking history information was available from 23,779 employees. However, age, sex, race, and employment type were missing for 1,058 employees, so they were eliminated from further analyses. The remaining 22,721 employees included 17,046 White males. All further data reported in this paper were from White males only.

Table 1 summarizes smoking habits of refinery and nonrefinery employees. Data are age-adjusted and shown by employment type, since ages and employment types of refinery and nonrefinery employees were dissimilar. Median ages were 39 and 36 for refinery and nonrefinery hourly employees, respectively, and 51 and 42 for refinery and nonrefinery salaried employees. The ratio of hourly to salaried White males was 3,753/1,599 (2.35) for refinery employees, but only 2,965/8,729 (0.34) for nonrefinery employees.

The only substantial difference between refinery and nonrefinery employees was that there were proportionately fewer current smokers among nonrefinery salaried employees. We did observe other small differences: there were fewer current smokers and more never smokers among refinery hourly employees than among nonrefinery hourly employees. The reverse was true for salaried employees. There were essentially no differences in proportions of ex-smokers between refinery and nonrefinery hourly employees, but there were more salaried ex-smokers in nonrefinery work.

Age-adjusted mean pack-years of current and ex-smoker employees are shown in Table 2. Unlike the different patterns observed for hourly and salaried employees in

TABLE 1—Age-adjusted Smoking Habits of Hourly and Salaried White Male Refinery and Nonrefinery Employees

Group	Smoking Habits (Per Cent)			
	Current	Never	Ex-smoker	Other
Hourly Employees				
Refinery (n = 3,753)	39.6	28.3	25.6	6.5
Nonrefinery (n = 2,965)	41.9	25.1	26.0	7.0
Salaried Employees				
Refinery (n = 1,599)	32.5	33.2	26.3	8.0
Nonrefinery (n = 8,729)	24.6	34.8	29.9	10.7

Table 1, both had fewer pack-years if they worked in a refinery.

Discussion

The most striking result from this study was finding more current smokers among hourly employees than among salaried employees, whether or not they worked in a refinery. These differences were in the same direction but greater than would have been expected from the literature on blue and white collar smoking.[3] The most obvious characteristics of hourly personnel which might account for greater smoking are socioeconomic. However, besides having less responsibility, hourly workers were also somewhat younger than salaried workers (median age 37 versus 42), less educated (only 48 per cent had gone to school beyond high school, versus 88 per cent of salaried workers), and had not worked for the company as long (median year of employment 1975 versus 1968). The fact that hourly employees were younger than salaried employees may explain why salaried employees smoked longer and had more pack-years than hourly employees, as the duration of smoking would be highly correlated with age, presumably from a cohort effect.

Data from non-White and female employees are not presented in this paper since the numbers available for analysis, particularly among refinery employees, were small. In general, however, smoking habits of Black male employees were similar to those of White males, except in some age groups over 44. Also, for Black males, differences between hourly and salaried employees were not as striking as for White males. Results for male employees of races other than Black or White did not show consistent patterns by employment type or work place. Female employees had a wide range of smoking habits depending on race and age, but in almost every age group, those who were White and salaried included proportionately fewer current and more ex- and never smokers than hourly. Differences between White female refinery and nonrefinery employees were inconsistent. There were too few Black females and females of races other than Black or White to permit meaningful comparisons.

TABLE 2—Age-adjusted Mean Cigarette Pack-years Smoked by Refinery and Nonrefinery White Male Employees

Group	Mean Pack-years			
	Current Smokers		Ex-smokers	
	No. in Group	Mean Pack-Years	No. in Group	Mean Pack-Years
Hourly employees				
Refinery	1,369	14.4	862	12.8
Nonrefinery	1,196	17.4	598	15.2
Salaried Employees				
Refinery	464	18.3	410	13.0
Nonrefinery	2,061	21.7	2,330	17.1

Results of this study have obvious relevance for epidemiologic studies of tobacco-associated cancers in refinery employees. The observed differences in smoking habits between refinery and nonrefinery White male employees do not seem of sufficient magnitude to account for major differences in SMRs for smoking-related causes of death. As would be expected if smoking prohibitions in refineries were really associated with less smoking, we found fewer current smokers and more never smokers among hourly refinery employees, and both hourly and salaried refinery employees had significantly fewer age-adjusted mean pack-years than nonrefinery employees. However, the former pattern was not observed for salaried employees, and the latter may be due to age differences as noted above.

It is unlikely that large smoking habit differences between refinery and nonrefinery employees exist but are obscured by transfers of employees from refinery to nonrefinery jobs. Such transfers are uncommon, particularly for hourly employees. It is also unlikely for salaried employees to become hourly, although the reverse happens frequently (almost 30 per cent of salaried personnel were once hourly according to a recent check of the company's refinery population). This sort of change, however, would be expected to obscure smoking habit differences between hourly and salaried, so real differences might be even greater than those observed.

Results of this study would indicate that employment type may be at least as important a variable as refinery work place for epidemiologic studies of oil company employees.

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