Work Hours and Self-Reported Hypertension Among Working People in California

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Abstract—Among the risk factors for hypertension, stress, especially work stress, has drawn increasing attention. Another potential work-related risk factor for hypertension identified in the past few years is work hours. This article presents an analysis of work hours and self-reported hypertension among the working population in the state of California. The data set used for this study comes from the Public Use File of the 2001 California Health Interview Survey. The logistic regression analysis shows a positive association between hours worked per week and likelihood of having self-reported hypertension. Compared with those working between 11 and 39 hours per week, individuals working 40 hours per week were 14% (95% CI: 1.01 to 1.28) more likely to report hypertension, those who worked between 41 and 50 hours per week were 17% (95% CI: 1.04 to 1.33) more likely to report hypertension, and those who worked ≥51 hours per week were 29% (95% CI: 1.10 to 1.52) more likely to report hypertension after controlling for various potentially confounding variables, including demographic and biological risk factors and socioeconomic status. This analysis provides evidence of a positive association between work hours and hypertension in the California working population. **(*Hypertension*. 2006;48:744-750.)**

Key Words: occupations ■ risk factors ■ behavior ■ hypertension, chronic

Epidemiological research has suggested that the work environment, especially work stress, plays an important role in the development of hypertension.[1–6] Recent research suggests that long work hours may also be a work environment risk factor for hypertension.[7–12] Research on work hours and hypertension, however, has primarily been conducted in Asia, beginning with the interest in Japan about "Karoshi," which is "sudden death from overwork."[13]

Several Japanese studies have found a positive association between long work hours and hypertension. Hayashi et al[14] showed that ambulatory blood pressure measurements (both systolic and diastolic) of workers with 88 hours of overtime per month were significantly higher than that of persons who worked only 25 hours of overtime per month. In addition, the diastolic ambulatory blood pressure of workers with 88 hours of overtime in the busy season was significantly higher than that of the same group of workers during a less busy comparison season. In another study, Iwasaki et al[15] showed significantly elevated systolic blood pressure among salesmen aged 50 to 60 years who spent ≥61 hours per week commuting and working as compared with those who spent ≤57 hours.

However, findings on the association between long work hours and hypertension have been inconsistent. In a 5-year follow-up study, Nakanishi et al[16] found that long working hours were negatively associated with hypertension risk among male Japanese white-collar workers. In a study of male Korean engineers, Park et al[17] also reported insufficient evidence for a possible link between long working hours, particularly >50 hours a week, and hypertension. Landsbergis[8] attributed the inconsistent findings in these studies in part to the use of casual clinic blood pressure measurement in some of the studies, which was less reliable than obtaining work-time blood pressure using ambulatory blood pressure monitoring.

Americans work longer hours than workers in most European countries, including the United Kingdom, Sweden, and Germany.[7,18] Average work hours of Americans even exceeded Japanese workers in recent years.[18] However, research on the health effects of long work hours in the US population has been limited. This study explored the relationship between work hours and self-reported hypertension using data from the 2001 California Health Interview Survey.

Long work hours may increase the risk of development of hypertension through several pathways. First, working longer hours implies shorter time available for recovery, and insufficient time for sleep is thought to be associated with disruption of physiological processes.[19–21] Second, long work hours are thought to be linked to hypertension risk related to lifestyles and behaviors, including smoking, unhealthy diet, and sedentary lifestyle. Furthermore, long work hours expose workers for longer periods of time to noxious psychosocial

Received May 17, 2006; first decision June 11 2006; revision accepted July 19, 2006.

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Hypertension **is available at http://www.hypertensionaha.org** **DOI: 10.1161/01.HYP.0000238327.41911.52**

factors in the work environment, such as job strain and effort–reward imbalance, which are believed to be biological arousal. These risk factors, in turn, may lead to permanent physiological changes, such as hypertension.[9]

The effect of work hours on hypertension may be mediated by occupation and socioeconomic status (SES). Persons who work long hours among those with higher occupation status and higher income may experience less negative health impact, compared with those of lower occupation status and lower income. It is important to control for potentially confounding personal risk factors, lifestyles and behaviors, and occupational factors in studying the association between long work hours and hypertension.

Methods

Data

The data set used for this study comes from the Public Use File of the 2001 California Health Interview Survey (CHIS2001), which was a random-digit dial telephone survey of the state of California civilian and noninstitutionalized population. The survey was conducted for the first time in 2001 and included >55 000 households. It was conducted in English, as well as in a number of other languages, including Spanish, Chinese, Vietnamese, Korean, and Khmer.[22]

The overall response rate was estimated as 37.7%, based on the screener completion rate and the extended interview completion rate.[23] The representativeness of CHIS2001 data were evident by the fact that its demographic characteristics were very similar to that of the 2000 US Census, and its health characteristics and behaviors were also very similar to a comparable random-digit dial telephone survey in California, the California Behavioral Risk Factor Surveillance System.[24]

The data set used for the analysis is composed of a sample size of 24 205 working-age individuals, ages 18 to 64, who worked ≥11 hours per week, from the CHIS2001. The respondents represented a population of ≈1 588 000 workers in California who met the age range and work hours criteria. This research was exempt from the institutional review board review, because it was a study of existing data without individual identifiers.

The CHIS2001 data set included information on demographic characteristics; job environment characteristics, such as occupation classification and work hours; ethnic classifications; and biological and health behavioral–related risk factors, such as tobacco use, body mass index (BMI), sedentary lifestyle, and self-reported diabetes.

Hypertension was assessed through self-report, and was elicited by the question, "Have you been told by the doctor that you have high blood pressure?" Hours of work per week was assessed by the question, "How many hours per week do you USUALLY work at ALL jobs or businesses?" The variable of hours of work per week was recoded into 4 categories: (1) 11 to 39, (2) 40, (3) 41 to 50, and (4) ≥51. Individuals with <11 hour of work per week were excluded from the analysis to avoid a possible bias because of the fact that those who work few hours per week (≤10) are more likely to have serious health conditions, including hypertension and cardiovascular diseases. The reference group used for work hours per week in the analysis was 11 to 39 hours per week.

Demographic variables used in the analysis include gender and age. Age was recoded into 3 categories: (1) 18 through 35, (2) 36 through 50, and (3) 51 through 64. The reference group used in the analysis was 18 to 35 years.

Biological risk factors for hypertension in the analysis included: self-reported diabetes, tobacco consumption status, sedentary lifestyle, and BMI. Tobacco consumption status was classified into 3 subgroups: never smokers, past smokers, and current smokers. They were generated by recoding 2 variables, "smoking at least 100 cigarettes during a respondent's lifetime and/or currently smoking cigarettes" and "smoke every day, some days, or not at all." Sedentary lifestyle was assessed with the questionnaire item, "Would you say that you sit most of the day, stand most of the day, or walk around a lot?" Self-reported diabetes and sedentary lifestyle were coded into dichotomized variables. BMI was classified into 3 categories: (1) under or normal weight (BMI <25), (2) overweight (BMI ≥25 and <30), and (3) obese (BMI ≥30). The reference group was for BMI in the analysis was "under or normal weight" (BMI <25).

Occupation was assessed originally through an open-ended question, which was later coded into a 13-category occupation variable in the CHIS2001 Public Use File. These 13 categories were recoded in this study into the following 8 occupational subgroups: (1) executives, administrators, and managers; (2) professionals and specialists; (3) sales workers; (4) administrative support workers; (5) service workers; (6) skilled workers (technicians, precision, craft, and repair workers); (7) semiskilled workers (machine operators, assembly workers, machine inspectors, transportation workers, or material or equipment movers); and (8) unskilled workers (private household service or protection service workers, equipment handlers, cleaners, or farmers). The reference group used for occupation in the analysis was the group of professionals and specialists.

SES variables included in the analysis were education and household income. Education was recoded into 4 categories: (1) less than high school, (2) high school, (3) some college, and (4) college and higher. The reference group for education was less than high school. Household income was recoded into 4 categories: (1) 0% to 99% federal poverty level, (2) 100% to 199% federal poverty level, (3) 200% to 299% federal poverty level, and (4) ≥300% federal poverty level. The reference group for income was 0% to 99% of the federal poverty level, which was defined as the poverty line in the United States.

Statistical Analysis

The California Health Interview Survey is a multi-stage, geographically stratified sample; therefore, sample weights based on the sample design and provided by the CHIS were used for all of the analyses to calculate estimates for the adult population of California. Variance estimation methods appropriate for the multistage sample were used to estimate variance for the population-weighted point estimates in making all of the statistical comparisons.[25,26] Specifically, Jackknife replication methods were used for variance estimation using the Stata 9.0 statistical package.[27] The approach used by the Jackknife replication method is to split the single sample into multiple subsamples and use the variation among the subsamples to obtain an estimate of the overall sampling variability.

Weighted descriptive statistics and measures of associations with estimates for SEs and 95% CIs were computed. Descriptive statistics for each study variable were generated to characterize factors associated with hours of work and self-reported hypertension, using χ^2 tests to compare categorical variables. The strength of association between work hours and self-reported hypertension was estimated with the odds ratio (OR) and 95% CI using logistic regression analysis, controlling for relevant demographic factors, biological risk factors, and SES variables.

Results

Descriptive statistics for the demographic and biological risk factors and the percentage of self-reported hypertension by different categories of the risk factors are presented in Table 1. Approximately 42% of the California workers were aged 18 to 35, ≈40% were aged 36 to 50, and 18% were aged 51 to 64. The overall percentage of self-reported hypertension was 15.3% among the California working-age population. The proportion of self-reported hypertension increased with age, ranging from 7.2% for the youngest age group to 31.3% for the oldest age group. The percentage of men (56.7%) was higher than that of women (43.3%); however, the percentage of self-reported hypertension was slightly higher for female workers (16.1%) than for male workers (14.1%). Of California working-age population, 50.7% were non-Hispanic white, 6.1% were

TABLE 1. Demographic and Biological Risk Profiles by Self-Reported Hypertension

Characteristics	% Population	% HTN	95% CI	*P*
Self-reported hypertension	15.3			
Age group, y				<0.0001
18 to 35	42.4	7.2	6.6 to 7.9	
36 to 50	39.6	16.6	15.7 to 17.5	
51 to 64	18.0	31.3	29.9 to 32.6	
Gender				<0.0001
Female	43.3	16.1	15.4 to 16.8	
Male	56.7	14.1	13.4 to 14.9	
Race/ethnicity				<0.0001
Non-Hispanic white	50.7	16.6	15.9 to 17.3	
Non-Hispanic black	6.1	22.1	19.8 to 24.5	
Hispanic	31.3	13.0	11.9 to 14.3	
Non-Hispanic Asian	11.9	12.5	11.5 to 13.4	
Tobacco consumption status				<0.0001
Never smokers	58.8	12.9	12.3 to 13.5	
Past smokers	22.1	21.0	19.8 to 22.1	
Current smokers	19.1	16.0	14.75 to 17.40	
Self-reported diabetes	3.6	40.9	37.7 to 44.3	<0.0001
Sedentary lifestyle	35.7	17.2	16.4 to 17.9	<0.0001
BMI				<0.0001
Under or normal weight	45.7	8.5	8.0 to 9.1	
Overweight	36.0	17.5	16.4 to 18.0	
Obese	18.4	28.3	26.8 to 30.0	
Education				<0.0001
Less than high school	17.4	15.0	13.6 to 16.5	
High school	22.6	14.1	13.1 to 15.3	
Some college	26.3	17.0	16.1 to 18.1	
College and higher	33.8	14.7	14.0 to 15.5	
Household income				<0.0001
0% to 99% federal poverty level	11.7	14.0	12.3 to 16.0	
100% to 199% federal poverty level	17.7	13.3	12.1 to 14.5	
200% to 299% federal poverty level	13.7	14.6	13.2 to 16.1	
≥300% federal poverty level	57.0	16.3	15.8 to 16.8	

% Population indicates the weighted percent in worker population of California; % HTN, percent with self-reported hypertension by risk factor category; 95% CI, 95% CI of the % HTN estimate; *P* based on χ^2 with jackknife variance estimates.

non-Hispanic black, 8.2% were non-Hispanic Asian, and 31.3% were Hispanic. The percentage of blacks who reported hypertension (22.1%) was significantly higher than that reported by other race/ethnic groups. There were no strong patterns of self-reported hypertension by education or household income, although it seemed that workers with some college had a somewhat higher percentage than other groups, whereas workers from the highest category of household income reported having more hypertension than the other household income groups. However, it should be noted that the associations in Table 1 are crude bivariate analyses and may be confounded by other correlated risk factors.

Approximately 59% of working-age individuals never smoked, and 13% of them reported having hypertension. The proportion of self-reported hypertension was relatively higher among the past smokers and current smokers, 21% and 16%, respectively, compared with those who never smoked. Among the working-age population, 3.6% reported having diabetes, and among these individuals, 40.9% reported having hypertension. Approximately 35.7% of working-age individuals reported having a sedentary lifestyle, and 17.2% of them reported having hypertension.

Table 2 shows the percentages of working-age individuals by occupation and hours of work per week and the percentage of self-reported hypertension by categories of these variables. Two occupational groups who had the highest percentages of self-reported hypertension were managers (17.1%) and unskilled workers (16.6%). Groups with the lowest percentages of self-reported hypertension were service workers (13.2%) and semi-skilled workers (14%). One explanation why that manager group had a higher self-reported hypertension may be the fact that most of the managers were older persons with higher blood pressure. There was a positive association between work hours and self-reported hypertension. The percentage of self-reported hypertension for the group with the shortest hours per week, between 11 to 39 hours, was the lowest (13.2%), and the group with longest hours per week, >50 was the highest among all of the groups (17.1%). Those who worked 40 hours per week (15.8%) and those who worked 41 to 50 hours per week (15.3%) had similar patterns of self-reported hypertension.

TABLE 2. Occupational Characteristics by Self-Reported Hypertension

Characteristics	% Population	% HTN	95% CI	*P*
Occupation				<0.0001
Manager	13.7	17.1	15.8 to 18.5	
Professional	16.1	14.0	12.7 to 15.4	
Sales worker	10.8	14.1	12.8 to 15.4	
Service worker	12.0	13.2	11.5 to 15.1	
Clerical worker	13.1	15.2	13.6 to 17.0	
Skilled worker	14.8	15.2	13.4 to 17.1	
Semiskilled worker	14.2	14.0	12.4 to 15.7	
Unskilled worker	5.5	16.6	13.9 to 19.7	
Hours work per week				<0.0001
11 to 39	23.1	13.2	12.2 to 14.3	
40	41.5	15.8	15.1 to 16.5	
41 to 50	21.7	15.3	14.4 to 16.3	
≥51	13.7	17.1	15.8 to 18.5	

% Population indicates the weighted percent in worker population of California; % HTN, percent with self-reported hypertension by risk factor category; 95% CI, 95% CI of the % HTN estimate; *P* based on χ^2 with jackknife variance estimates.

To evaluate potential confounding variables that should be included in a multivariate analysis of self-reported hypertension and work hours, we also examined associations between work hours per week and the demographic and biological risk factors. The findings of the bivariate analyses in Table 3 indicate that work hours were associated with most of the demographic and biological risk factor variables. Some of the associations were quite strong. For example, gender was strongly associated with self-reported hypertension, with 18.2% of men working ≥51 hours per week compared with 7.8% among women. College graduates were more likely to work longer hours than workers in the other education categories. Household income had a strong positive association with hours worked per week. Self-reported hypertension was also higher among workers who were past or current smokers, compared with those who never smoked and among overweight and obese workers compared with under or normal weight workers. Associations for many of the variables were not as strong, although the *P* values were significant, which may be because of the large study population size.

A multivariate logistic regression model was developed to evaluate the relationship between work hours and self-reported hypertension, controlling for the demographic variables, biological risk factors, and occupation. This model included all of the variables shown in Tables 1 and 2, except for BMI. The rationale was that increasing work hours may act as a risk factor for obesity, as well as for hypertension. In other words, BMI may be an intervening variable, but it is not a confounder for the relationship between hypertension and work hours.

The findings of the logistic regression analysis are shown in Table 4. Expected patterns for hypertension are observed among the demographic variables and biological risk factors. Age, male gender, lifetime cigarette use, self-reported diabetes, and a sedentary lifestyle were all positively associated with self-reported hypertension, whereas household income was negatively associated with self-reported hypertension. Non-Hispanic blacks had significantly higher odds of reporting hypertension compared with non-Hispanic whites and non-Hispanic Asians and Hispanics.

Compared with professionals, clerical workers had a significantly higher prevalence of self-reported hypertension (OR: 1.23; 95% CI: 1.00 to 1.51). Unskilled workers were the most likely to have self-reported hypertension (OR: 1.50; 95% CI: 1.00 to 2.25), compared with professionals. This pattern of clerical and unskilled workers having a higher prevalence of hypertension is consistent with research on job strain, in which low control over work tasks is a risk factor for ambulatory blood pressure and hypertension.

There was a monotonic exposure–response pattern between work hours and self-reported hypertension. After controlling for all of the other risk factors, work hours per week were independently and significantly associated with self-reported hypertension. Individuals who worked 40 (OR: 1.14; 95% CI: 1.01 to 1.28) or 41 to 50 hours per week (OR: 1.17; 95% CI: 1.04 to 1.33) were at intermediate risk of hypertension. Individuals who worked ≥51 hours per week were 1.29 times (95% CI: 1.10, 1.52) more likely to have self-reported

TABLE 3. Demographic and Biological Risk Profiles by Work Hours per Week

	Work Hours per Week				
Characteristics	11 to 39	40	41 to 50	≥51	*P*
Age group, y					<0.0001
18 to 35	27.2	41.4	19.3	12.1	
36 to 50	18.5	42.1	24.2	15.2	
51 to 64	23.4	40.6	21.9	14.2	
Gender					<0.0001
Female	34.3	42.1	15.7	7.8	
Male	14.5	41.1	26.3	18.2	
Race/ethnicity					<0.0001
Non-Hispanic white	24.3	35.3	24.5	15.9	
Non-Hispanic black	23.0	48.2	17.1	11.7	
Hispanic	21.9	47.7	8.8	11.6	
Non-Hispanic Asian	20.7	48.9	19.8	10.6	
Tobacco consumption status					<0.0001
Never-smokers	24.8	41.5	21.1	12.6	
Past smokers	20.2	41.3	23.5	15.1	
Current smokers	21.1	42.1	21.4	15.4	
Self-reported diabetes	21.2	46.5	18.5	13.8	0.02
Not self-reported diabetes	32.1	41.2	21.8	13.7	
Sedentary lifestyle	17.1	43.1	25.5	14.3	<0.0001
Not sedentary lifestyle	26.3	40.7	20.0	13.3	
BMI					<0.0001
Under or normal weight	27.9	40.9	19.8	11.4	
Overweight	18.4	41.7	23.9	16.0	
Obese	20.0	42.9	22.1	14.9	
Education					<0.0001
Less than high school	21.1	49.2	16.1	13.6	
High school	26.2	43.6	19.5	10.7	
Some college	27.3	41.0	19.5	12.2	
College and higher	18.7	36.7	27.7	16.9	
Household income					<0.0001
0% to 99% federal poverty level	34.0	46.4	11.3	8.4	
100% to 199% federal poverty level	26.3	46.5	15.9	11.3	
200% to 299% federal poverty level	24.3	44.3	19.3	12.1	
≥300% federal poverty level	19.5	38.3	26.2	15.9	
Occupation					<0.0001
Professional	23.3	35.2	25.8	15.7	
Manager	14.0	32.9	33.5	19.5	
Clerical worker	29.5	46.2	17.6	6.7	
Sales worker	31.4	28.2	23.2	17.2	
Service worker	40.9	35.9	12.1	11.2	
Skilled worker	29.5	46.2	17.6	6.7	
Semiskilled worker	11.7	51.1	24.0	13.1	
Unskilled worker	15.1	49.4	20.8	14.7	

P based on χ^2 with jackknife variance estimates.

TABLE 4. Multivariate Logistic Regression of Self-Reported Hypertension

Characteristics	OR	95% CI	*P*
Age group, y			
18 to 35	1.00		
36 to 50	2.53	2.18 to 2.94	<0.0001
51 to 64	5.71	4.93 to 6.62	<0.0001
Gender			
Female	1.00		
Male	1.24	1.11 to 1.39	<0.0001
Race/ethnicity			
Non-Hispanic white	1.00		
Non-Hispanic black	1.65	1.34 to 2.03	<0.0001
Hispanic	0.85	0.73 to 0.98	0.03
Non-Hispanic Asian	0.89	0.77 to 1.02	0.10
Education			
Less than high school	1.00		
High school	0.95	0.78 to 1.16	0.58
Some college	1.03	0.84 to 1.25	0.79
College and higher	0.81	0.67 to 0.98	0.03
Household Income			
0% to 99% federal poverty level	1.00		
100% to 199% federal poverty level	0.81	0.63 to 1.04	0.10
200% to 299% federal poverty level	0.84	0.62 to 1.14	0.27
≥300% federal poverty level	0.77	0.60 to 0.98	0.04
Tobacco consumption status			
Never smokers	1.00		
Past smokers	1.26	1.13 to 1.41	<0.0001
Current smokers	1.16	1.01 to 1.32	0.03
Self-reported diabetes	2.66	2.23 to 3.19	<0.0001
Sedentary lifestyle	1.10	0.99 to 1.21	0.066
Occupation			
Professional	1.00		
Manager	1.11	0.96 to 1.27	0.15
Clerical worker	1.23	1.00 to 1.51	0.05
Sales worker	1.00	0.85 to 1.18	0.97
Service worker	1.06	0.88 to 1.27	0.54
Skilled worker	1.05	0.87 to 1.20	0.58
Semiskilled worker	0.97	0.78 to 1.20	0.75
Unskilled worker	1.50	1.00 to 2.25	0.05
Work hours per week			
11 to 39	1.00		
40	1.14	1.01 to 1.28	0.04
41 to 50	1.17	1.04 to 1.33	0.01
≥51	1.29	1.10 to 1.52	0.002

hypertension than individuals who worked 11 to 39 hours per week.

When BMI was included in the multivariate model, the overall patterns remained the same. The association between work hours per week and self-reported hypertension was still evident, although the association was somewhat weaker. Individuals who worked ≥51 hours per week were 1.21 times (95% CI: 1.02 to 1.44; $P=0.03$) more likely to have self-reported hypertension than individuals who worked 11 to 39 hours per week. Individuals who worked 40 (OR: 1.12; 95% CI: 0.98 to 1.26) or 41 to 50 hours per week (OR: 1.12; 95% CI: 0.98 to 1.28) were still at intermediate risk of hypertension, although the associations were weaker.

Discussion

The findings of this study with population-based data demonstrate that increasing work hours may act as a risk factor for hypertension after controlling for biological and behavioral-related risk factors and for occupation and SES. Although much of the previous research on work hours and hypertension has been conducted in Asia, this study is on a US working-age population and provides evidence supporting research conducted in Japan. This study contributes to the growing body of literature on the health effects of work hours. Previous research suggests that long work hours have increased mortality[10,19,28,29] and have an impact on a number of adverse health conditions, including cardiovascular disease,[13,30,31] diabetes,[32,33] and hypertension.[8,14–16,34] In addition, a number of studies have also shown that long work hours lead to disability retirement[35] and are related to self-reported physical health problems and fatigue,[36] as well as increased rates of accidents and injuries at work.[9,37,38]

This study also shows a statistically significant occupational variation in self-reported hypertension. The pattern of professionals having a lower prevalence of hypertension than that of clerical and unskilled workers is consistent with other studies, which suggests that occupations requiring more challenging and mentally active work may have a protective effect against hypertension.[39–41] The negative association between SES and self-reported hypertension and the ethnic variation in self-report hypertension indicated in the study are also consistent with previous studies on SES and hypertension.[42,43]

Self-reported hypertension is a common form of assessment used in large-scale surveys in the absence of measured hypertension. The reliability and validity of self-reported hypertension has been examined. Substantial agreement was found in a study comparing subjects' self-reported hypertension with information from medical records.[44] Other studies found that the proportion of self-reported hypertension was usually lower than the measured blood pressure.[45,46] The National Health and Nutrition Examination Survey found that 30% of participants were unaware that they had hypertension.[47] Self-reported hypertension could, therefore, be treated as a comparable measurement of "awareness of hypertension."[48] Self-reported hypertension seems to be an unbiased underestimation of true hypertension.

It is important to note the strength of population-based survey data in measuring work hours. It is likely that people have >1 job, and work hour information about those who may have >1 job may be delimited to the number of work hours in a specific organizational system. This study, however, covered workers from various occupations and industries without boundaries of different work sites or employment systems, and, thus, total numbers of hours work reported may be a more accurate estimate.

However, this analysis could not capture the health effect of nonpaid work hours at home because of limitations of the data. It is important to assess the health effect of nonpaid work hours among people with or without a paid job outside of the home. It is common for working women to work "second shifts" to fulfill their household and childcare responsibilities domestically after their full-time or part-time paid job outside of the home.[49]

Population-based and cross-sectional studies on health effects of work hours may be biased because of selection effects ("the healthy worker effect"), because healthier workers tend to work longer hours. To avoid a possible bias because of the healthy worker effect, this study excluded individuals with <11 hours of work per week from the analysis, because those who work fewer hours per week (≤10) are more likely to have serious health conditions, including hypertension and cardiovascular diseases. However, this study is not able to shed light on the potential impact of duration of exposure to long working hours that has been used often in shift work research. Clearly, studies with better measurements for blood pressure and work hours and longitudinal designs are needed in future research.[19,50,51]

Perspectives

The results from this study with cross-sectional and population-based data suggest that increased work hours may act as a risk factor for hypertension. This study has implications at both the individual and societal levels. At the individual level, one implication for this study is the need to increase public awareness of the potential harmful health impacts of long work hours on the cardiovascular system, especially in light of the asymptomatic nature of hypertension. This is a challenging task, because people are often driven to work long hours either voluntarily or involuntarily because of organizational (employer) demands, cultural beliefs, attitudes, or economic reasons.

At the societal level, the results from this study have implications for work hour regulations. There is a long-standing debate about long work hours in different countries. The European Union work hour directive has included a maximum of 48 hours of work per week.[52] The Japanese government has implemented administrative guidance on overtime, which suggests that all employees should not work >45 hours of overtime per month and that there will be government intervention if overtime exceeds 100 hours per month.[10] Nearly every country has some type of regulation regarding limiting working time for adults except the United States. Despite long-standing and widespread agreement that work hours should be limited, preventing excessive overtime remains a pressing issue for the United States.

Acknowledgments

We thank Dr Paul Landsbergis and Dr Akinori Nakata for their insightful comments on earlier versions of this manuscript.

Disclosures

None.

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