Activity Status and Cardiovascular Diseases: a Cross-sectional Study Based on the Results of Rafsanjan Cohort Study (2020)

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Abstract
Background: Cardiovascular disease (CVD) is the leading cause of morbidity and mortality across the globe. Activity status is used as a social class marker of CVDs.

Objectives: The present study aimed to analyze the associations between occupational status and CVDs in Iranian population.

Methods: The present cross-sectional study was conducted on 9,990 subjects aged 35-70 years enrolled in the Rafsanjan Cohort Study (RCS), as one of the Prospective Epidemiological Research Studies in Iran (PERSIAN). Occupational status, socio-demographic characteristics, physical activity, cigarette and hookah smoking, opium use, and alcohol consumption were assessed through six predefined questionnaires. Anthropometric, body mass index (BMI), medical history, and laboratory tests were also performed. CVDs were defined as the presence of ischemic heart disease (IHD) or myocardial infarction (MI). Prevalence ratios were calculated for each activity status and CVD using Poisson regression models.

Results: The occupational activities were assigned to two classes: homemaker (40.17%) was the largest group of class I, followed by self-employed (34.44%), employed (13.03%), retired (10.38%), and unemployed (1.62%). In class II, the largest group included pistachio farmers (12.61%), copper miners (3.62%), and others (83.76%). A percentage of people were literate (95.00%), especially in the homemaker group (61.39%). In general, 8.71% and 2.98% of participants suffered from IHD and MI, respectively. After adjusting for demographic and other characteristics, there was no significant association between occupational status and CVDs.

Conclusion: As evidenced by the obtained results, activity status was not associated with the risk of IHD and MI.

Keywords: Cardiovascular disease, Ischemic heart disease, Occupational status, Prospective epidemiological research studies in Iran (PERSIAN)

1. Background

The estimation of non-communicable diseases (NCDs), especially cardiovascular diseases (CVDs), is of utmost importance in health and policy management (1). Ischemic heart disease (IHD) and stroke are recognized as the first and second causes of death in Iran, respectively. CVDs are the first leading cause of mortality and disabilities, leading to 46% of all deaths and 20%-23% of the burden of disease in Iran (2).

Although the risk of CVDs in developed countries is higher among people with lower social status (3) in developing populations, they have been reported to be more prevalent in people with upper social status (4). This discrepancy can be partially ascribed to higher exposure to harmful aspects of modernization, such as sedentary lifestyle, cigarette smoking, and obesity in the two mentioned social classes.

The major risk factors of CVD are cigarette smoking, opium use, hypertension, and increased blood lipid level, especially low-density lipoproteins (LDL) cholesterol (5). Other important factors include socio-economic and cultural variants (6), nutrition (7), inadequate physical activity (8), industrialization and urbanization (9), increasing metabolic and physical risk factors (10), as well as low accessibility to primary care and treatment (2). Furthermore, some studies pointed to the association between selected chemicals and CVD risk factors (11, 12). Occupational stress is also considered a CVD risk factor (13).

Some studies have presented various occupational activities as a social class marker in the epidemiologic study of CVDs according to their exposure and level of occupational stress (14, 15). Occupational status has been reported to be correlated with CVDs or the risk factors of CVD among various populations (16). Among different individual-level factors, aging is considered the strongest predictor of CVDs. The circulatory system
degnerates with increasing age, as other organs in the body do. Therefore, older individuals are more prone to CVDs, compared to their younger counterparts (16,17). Therefore, health promotion strategies to prevent CVD risk factors, as well as the early detection and treatment of CVDs, can reduce mortality and morbidity worldwide.

Therefore, assiduous attention has now turned to activity status as an explanatory factor to explain CVD risk. Health promotion strategies to prevent and control CVD risk factors, as well as the early detection of the disease and treatment of acute and chronic CVD events, are essential to reduce the burden of CVD in Iran.

2. Objectives

The present study aimed to analyze cardiovascular disease risk factors and related health behaviors by activity status.

3. Methods

3.1. Study population

The study population consisted of 9,990 subjects aged 35-70 years enrolled in the Rafsanjan Cohort Study (RCS), as part of the prospective epidemiological research studies in Iran (PERSIAN) (18), both urban and suburban areas of Rafsanjan located in South of Iran. Their selection was carried out according to the following criteria: 1) inclusion of areas with minimum migration rates in order to limit loss to follow-up rate, 2) inclusion of populations with different socioeconomic levels, as well as environmental and occupational exposures (18). The study protocol was designed according to the Persian cohort study and was approved by the Ethics Committee of Rafsanjan University of Medical Sciences (IR.RUMS.REC.1399.036).

3.2. Outcome assessment

All participants were interviewed by expert interviewers to complete the related questionnaires on demography, socioeconomic status, occupational status, personal habits, biochemical tests, history of the disease, blood pressure, body mass index (BMI), and physical activity. All of the questionnaires were validated in the Persian cohort study (19).

The prevalence of CVD was assessed using self-reported information retrieved from the medical history questionnaire. Prevalent CVDs were IHD and myocardial infarction (MI) based on the self-reporting of the participants. The criteria to diagnose the mentioned disorders were based on a history of angina, MI, coronary bypass surgery, balloon angioplasty, or stent placement in coronary arteries (18).

Education level was originally coded as 1) no schooling, 2) 1-5 years of schooling, 3) 6-12 years of schooling, and 4) university/college degree (18).

The daily physical activity of the participants in both leisure and activity status was assessed using a standardized physical activity questionnaire. Each activity was also weighted by its relative metabolic cost, referred to as a metabolic equivalent (MET), thereby deriving MET-hours per day for 24 h (19,20). The personal habit data, including alcohol consumption, cigarette and hookah smoking, and drug use (e.g., opium, heroin, cocaine, crack, and crystal) were expressed as yes (formerly or currently) and no (never) (18). The wealth score index (WSI) was categorized into four groups: low income (1st quartile: ≤ 0.6069), low-middle income (2nd quartile: 0.6069 to 0.0349), middle-high income (3rd quartile: 0.0349 to 1.169) and high income (4th quartile: ≥ 1.170) (19).

3.3. Statistical analyses

The prevalence of hypertension and diabetes mellitus was assessed through a self-reported questionnaire about medical history or drugs. The BMI was also expressed as Mean± standard deviation (18). The occupational activity was coded according to the system of the Rafsanjan Cohort Profile. Following that, the obtained groups were assigned to two classes. Class I, including 1) homemaker, 2) unemployed, 3) retired, 4) self-employed, 5) employed, and class II, including 1) pistachio farmers, 2) copper miners, and 3) others. Subjects in class II may overlap with class I, and some cases had two occupations (18).

The prevalence of occupational class, IHD, and MI were compared across categorical and continuous variables using the Pearson χ2 test, independent t-test, and analysis of variance, respectively. Logistic regression models were employed to investigate the relationships of occupational classes with IHD and MI prevalence. Confounders were identified using a directed acyclic graph based on subject knowledge and the relevant epidemiological literature. Thereafter, they were sequentially entered into models according to their hypothesized strengths of association with occupational class, IHD, and MI. Model 1 included basic demographic characteristics (age, gender, education and WSI) considered to be most strongly related to both exposure and CVDs. Model 2 contained additional adjustments for physical activity level and habit factors (e.g., hookah smoking, alcohol drinking, and misuse/abuse of
controlled drugs that were additionally considered to confound occupational IHD and MI associations. Model 3 included all variables in adjusted model 2 and additionally included hypertension, cholesterol, BMI, diabetes mellitus, triglycerides, LDL, HDL, AST, ALT, and alkaline phosphatase. These were hypothesized to be potential confounders on the causal pathways that could explain occupational IHD and MI relationships. In all models, variables of age, cholesterol, BMI, triglycerides, LDL, HDL, AST, ALT, and alkaline phosphatase were entered continuously. Data analyses were performed in STATA software (version 12) (STATA Corp, College Station, TX). All p-values were two-sided, and p-values <0.05 and 95% confidence intervals were considered statistically significant.

4. Results
The number of participants was estimated at 9,990 cases, including 4,655 (46.60%) males and 5,335 (53.40%) females, according to the baseline phase of the Rafsanjan adult cohort study. Table 1 displays the demographic, lifestyle, personal habits, anthropometric measures, clinical risk factors, and laboratory assessment of participants.

Homemaker (40.17%) was the largest group of class I, followed by self-employed (34.44%), employed (13.03%), retired (10.38%), and unemployed (1.62%). Class II included pistachio farmers (12.61%), copper miners (3.62%), and others (83.76%). In terms of education, a percentage of people were illiterate (9.50%), especially in the homemaker group (61.39%).

Regarding physical activity, unemployed participants had the lowest mean (33.06±9.15). According to the data, the participants were assigned to four categories based on wealth information involving 2342 (23.47%) = low income, 2863 (28.70%) = low-middle income, 3997 (40.06%) = middle-high income, and 775 (7.77%) = high income. The largest proportions of high and low-income subjects were self-employed and homemaker, respectively. The number of people who used cigarettes was calculated at 2,542 (25.4%), alcohol=1,350 (13.6%), hookah=1,702 (17.2%), and drug=2,378 (23.8%). The highest prevalence of the above-mentioned lifestyle habits was observed in the self-employed group.

The proportions of subjects with high blood pressure and diabetes mellitus were 22.5% and 19.5%, respectively. The highest percentages of mentioned disorders were found among the retired (31.3% and 27.7%). The highest mean scores of cholesterol (203.79±47.25) and LDL cholesterol (110.69±31.41) were found among the homemakers. The highest mean scores of triglycerides (175.66±128.96) and ALT (25.45±16.63) were reported among the employed. The lowest mean score of HDL cholesterol was reported in the unemployed (55.15±9.93). The mean BMI was considerably higher in homemakers (29.53±4.96).

Furthermore, about occupational class II, the highest percentage of diabetes mellitus (20.7%) and the highest mean of triglycerides (178.55±119.59) were found in pistachio farmers. The lowest and highest mean scores of HDL cholesterol (53.68±9.26) and ALT (24.35±15.64) were reported in copper miners, respectively (Table 1).

The prevalence of IHD and MI were obtained at 8.71% and 2.98% among all participants (Table 2) and was considerably higher among males. There was a high prevalence of IHD and MI among homemakers and self-employed, respectively. Both of these CVDs were more prevalent among cases with 6-12 years of schooling. Moreover, cholesterol, LDL, HDL, Alkaline phosphate, diabetes mellitus, hypertension, drug use, smokers, and BMI has a direct association with the mentioned disorders were found among the unemployed (55.15±9.93).

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### Table 1. Selected characteristics in relation to activity status among participants in the Rafsanjan cohort study (n=9990).

| Characteristics | All | Homemaker | unemployed | Retired | Self-employed | Employed | P-Value | Pistachio farmer | Copper miners | Others | P-Value |
|-----------------|-----|------------|-------------|---------|---------------|----------|---------|-----------------|--------------|---------|---------|
| Age(year)       | 49.70±9.37 | 50.34±9.50 | 51.44±10.73 | 48.70±6.00 | 46.57±9.32 | 44.56±7.23 | <0.001 | 53.92±9.30 | 51.15±10.46 | 49.26±9.41 | <0.001 |
| Gender: no. (%)| Female: 5335 (53.4) | 5842 (95.7) | 38 (25) | 298 (27.6) | 779 (22.4) | 387 (29.7) | <0.001 | 104 (83.5) | 21 (53.8) | 5210 (62.3) | <0.001 |
| Male: 4654 (46.6) | 171 (4.3) | 114 (75) | 703 (72.4) | 2671 (77.6) | 915 (70.3) | <0.001 | 1156 (91.7) | 341 (94.2) | 3150 (37.7) | <0.001 |
| Education: no. (%)| No schooling 948 (9.5) | 502 (14.5) | 21 (14.5) | 72 (6.7) | 253 (7.4) | 20 (1.5) | <0.001 | 144 (11.5) | 14 (3.9) | 790 (9.5) | <0.001 |
| 1-5 years of school 2547 (25.5) | 1452 (36.2) | 40 (17.6) | 177 (16.4) | 799 (23.2) | 79 (6.1) | <0.001 | 306 (24.3) | 65 (18) | 217 (26) | <0.001 |
| 6-12 years of school 4847 (48.6) | 1752 (43.7) | 70 (48.3) | 514 (47.5) | 2026 (58.9) | 485 (37.3) | <0.001 | 624 (49.6) | 192 (53) | 403 (48.2) | <0.001 |
| University/college 1639 (16.4) | 227 (5.7) | 14 (9.7) | 318 (29.4) | 363 (10.5) | 717 (55.1) | 183 (14.6) | 91 (25.1) | 1365 (16.3) | <0.001 |
| Physical activity: MET | 38.77±6.36 | 37.60±3.47 | 33.06±9.15 | 36.41±4.46 | 41.30±8.34 | 38.29±5.78 | <0.001 | 41.63±9.02 | 37.67±7.07 | 38.39±5.70 | <0.001 |
| Wealth score index-no. (%)| Low income 2342 (24.7) | 1154 (28.0) | 70 (48.3) | 141 (13.0) | 841 (24.45) | 136 (10.45) | 242 (19.25) | 36 (9.94) | 206 (24.69) | <0.001 |
| Low-middle income 2863 (28.70) | 1263 (31.50) | 36 (24.83) | 290 (75.77) | 1037 (30.15) | 229 (17.59) | <0.001 | 380 (30.23) | 94 (25.97) | 238 (28.58) | <0.001 |
| Middle-high income 3997 (40.66) | 1435 (35.79) | 30 (20.69) | 536 (49.58) | 1302 (37.86) | 694 (53.30) | 159 (41.29) | 175 (48.34) | 330 (39.52) | <0.001 |
| High income 775 (7.77) | 158 (3.94) | 9 (6.21) | 106 (9.81) | 259 (7.53) | 243 (18.66) | 116 (9.23) | 57 (15.75) | 602 (72.0) | <0.001 |
Table 1. Continued

| Characteristic | MI | P-value | IHD | P-value |
|----------------|----|---------|-----|---------|
| Caffeine intake |     |         |     |         |
| Low            | 1   | <0.001  | 0.22| 0.651   |
| High           | 2   | <0.001  | 0.22| 0.651   |
| Physical activity. MET |     |         |     |         |
| Mean± SD      | 70±9.7 | <0.001  | 0.07| <0.001  |

Table 2. Prevalence of IHD and MI diseases among participants in the Rafsanjan cohort study (n=9990).

| Characteristic | MI | P-value | IHD | P-value |
|----------------|----|---------|-----|---------|
| Occupational classes 1- no. (%) |     |         |     |         |
| Homemaker      | 74 (2.5) | 35 (4.0) | 0.070 |
| Unemployed     | 11 (3.7) | 25 (2.9) | 0.001 |
| Retired        | 84 (28.4) | 175 (20.1) | 0.001 |
| Self-employed  | 101 (34.1) | 254 (29.2) | 0.001 |
| Employed       | 26 (8.8) | 63 (7.2) | 0.001 |
| Occupational classes 2- no. (%) |     |         |     |         |
| Pesticide farmer | 72 (2.4) | 159 (18.3) | 0.001 |
| Copper miners  | 16 (5.4) | 40 (4.6) | 0.001 |
| Others         | 208 (70.5) | 671 (77.1) | 0.001 |
| Age (year)     |     |         |     |         |
| Mean± SD      | 57.8±7.5 | 57.9±7.5 | 0.001 |
| Gender- no. (%) |     |         |     |         |
| Female         | 9 (31.8) | 427 (49.1) | 0.007 |
| Male           | 202 (68.2) | 443 (50.9) | 0.007 |
| Education-no. (%) |     |         |     |         |
| No            | 5 (18.2) | 175 (20.1) | 0.001 |
| 1-5 years of school | 84 (28.4) | 263 (30.2) | 0.001 |
| 6-12 years of school | 116 (39.2) | 338 (38.9) | 0.001 |
| University/college | 42 (14.2) | 94 (10.8) | 0.001 |
| Physical activity. MET |     |         |     |         |
| Mean± SD      | 36.7±5.3 | 37.9±5.3 | 0.001 |
| Wealth score index-no. (%) |     |         |     |         |
| Low            | 78 (26.35) | 235 (27.01) | 0.001 |
| Low - middle income | 79 (26.69) | 287 (32.99) | 0.001 |
| Middle-high income | 121 (40.88) | 301 (34.60) | 0.001 |
| High income    | 18 (6.06) | 47 (5.40) | 0.001 |

* Occupational class 2 overlaps with occupational class 1, and some cases had two jobs.
Abbreviations: SD: standard deviation; MET: metabolic equivalent.
Table 2. Continued

| Smoking - no. (%) | Yes | 152 (51.4) | 0.001 | 286 (32.9) | 0.001 |
| Hookah consumption - no. (%) | Yes | 63 (21.3) | 0.057 | 130 (15) | 0.70 |
| Drug consumption - no. (%) | Yes | 154 (52) | 0.001 | 313 (36) | 0.001 |
| Hypertension - no. (%) | Yes | 119 (40.2) | 0.001 | 440 (50.6) | 0.001 |
| Diabetes mellitus - no. (%) | Yes | 124 (41.9) | 0.001 | 343 (39.4) | 0.001 |
| Cholesterol | Mean ± SD | 179.70 ± 48.41 | 0.001 | 183.49 ± 45.62 | 0.001 |
| Triglycerides | Mean ± SD | 179.81 ± 19.37 | 0.083 | 168.76 ± 95.41 | 0.964 |
| LDL cholesterol | Mean ± SD | 92.71 ± 38.93 | 0.001 | 95.36 ± 36.99 | 0.001 |
| HDL cholesterol | Mean ± SD | 52.51 ± 10.31 | 0.001 | 55.11 ± 11.02 | 0.001 |
| S.G.O.T (ALT) | Mean ± SD | 19.97 ± 9.06 | 0.873 | 20.18 ± 10.37 | 0.417 |
| S.G.P.T (ALT) | Mean ± SD | 20.91 ± 1.26 | 0.482 | 20.98 ± 12.76 | 0.276 |
| Alkaline phosphatase | Mean ± SD | 245.35 ± 68.38 | 0.001 | 237.73 ± 77.66 | 0.001 |
| BMI | Mean ± SD | 27.25 ± 4.44 | 0.040 | 28.18 ± 4.71 | 0.023 |

Abbreviations: IHD = ischemic heart disease; MI = myocardial infarction; SD = standard deviation; HDL cholesterol = high density lipoprotein cholesterol; LDL cholesterol = low density lipoprotein cholesterol; BMI = Body mass index; MET = metabolic equivalent

Table 3 reports the associations of occupational status with IHD and MI using various models. According to the crude model, the highest odds ratio (OR) for IHD was observed in the unemployed

| Occupational classes 1 | IHD | HOM | CR | Adjusted model 1 | Adjusted model 2 | Adjusted model 3 |
|-----------------------|-----|-----|----|------------------|------------------|------------------|
| Employed              | 1   | 1   | 1  | 1                | 1                | 1                |
| Homemaker             | 1.89 (1.43-2.49) | 1.15 (0.82-1.60) | 1.17 (0.83-1.64) | 1.11 (0.78-1.57) |
| Retired               | 3.79 (2.81-4.89) | 1.01 (0.73-1.40) | 0.91 (0.66-1.26) | 0.88 (0.63-1.23) |
| Self-employed         | 1.57 (1.18-2.08) | 0.88 (0.65-1.20) | 0.91 (0.67-1.23) | 0.89 (0.65-1.22) |
| unemployed            | 3.94 (2.39-6.49) | 1.55 (0.91-2.66) | 1.22 (0.71-2.11) | 1.20 (0.68-2.10) |
| MI                    | 1   | 1   | 1  | 1                | 1                | 1                |
| Employed              | 0.92 (0.58-1.44) | 0.88 (0.51-1.54) | 0.98 (0.55-1.74) | 0.99 (0.56-1.82) |
| Homemaker             | 4.13 (2.64-6.45) | 1.29 (0.80-2.09) | 1.07 (0.66-1.75) | 1.08 (0.65-1.78) |
| Retired               | 1.48 (0.96-2.30) | 0.86 (0.55-1.36) | 0.85 (0.54-1.35) | 0.85 (0.53-1.36) |
| Self-employed         | 3.89 (1.88-8.04) | 1.65 (0.76-3.55) | 1.04 (0.48-2.28) | 1.06 (0.48-2.36) |

Occupational classes 2

| IHD others | 1   | 1   | 1  | 1                | 1                | 1                |
| Pistachio farmer | 1.65 (1.38-1.98) | 1.01 (0.82-1.25) | 1.09 (0.88-1.36) | 1.08 (0.86-1.36) |
| Copper miners    | 1.42 (1.02-1.99) | 1.03 (0.72-1.49) | 0.92 (0.63-1.34) | 0.99 (0.68-1.45) |

MI

| IHD others | 1   | 1   | 1  | 1                | 1                | 1                |
| Pistachio farmer | 2.37 (1.80-3.13) | 1.05 (0.77-1.43) | 1.16 (0.85-1.59) | 1.12 (0.81-1.55) |
| Copper miners    | 1.81 (1.07-3.04) | 0.92 (0.53-1.59) | 0.80 (0.46-1.38) | 0.81 (0.47-1.42) |

| OR (95%CI)* | Adjusted model 1 | Adjusted model 2 | Adjusted model 3 |
|-------------|------------------|------------------|------------------|
| MI          | Other            | 1                | 1                | 1                |
| Homemaker   | 0.92 (0.58-1.44) | 0.88 (0.51-1.54) | 0.98 (0.55-1.74) | 0.99 (0.56-1.82) |
| Retired     | 4.13 (2.64-6.45) | 1.29 (0.80-2.09) | 1.07 (0.66-1.75) | 1.08 (0.65-1.78) |
| Self-employed | 1.48 (0.96-2.30) | 0.86 (0.55-1.36) | 0.85 (0.54-1.35) | 0.85 (0.53-1.36) |
| unemployed  | 3.89 (1.88-8.04) | 1.65 (0.76-3.55) | 1.04 (0.48-2.28) | 1.06 (0.48-2.36) |

* Abbreviations: IHD = ischemic heart disease, MI = myocardial infarction

a The baseline model is stratified on Occupational Classes.

b The adjusted model 1 is adjusted for confounding variables of age (continuous variable), education (continuous variable), gender (male/female), and wealth score index.

c The adjusted model 2 has additional adjustment for habit confounding variables (smoking, alcohol drinking, and misuse/abuse of drugs), and physical activity level (continuous variable).

d The adjusted model 3 has additional adjustment for hypertension (yes/no), cholesterol (continuous variable), body mass index (continuous variable), diabetes mellitus (yes/no), Triglycerides (continuous variable), LDL cholesterol (continuous variable), HDL cholesterol (continuous variable), S.G.O.T (AST) (continuous variable), S.G.P.T (ALT) (continuous variable), and Alkaline phosphatase (continuous variable).

* Occupational class 2 overlaps with occupational classes 1, and some cases had two jobs.

Abbreviation: IHD = ischemic heart disease, MI = myocardial infarction
activities have a higher e associated with a 21 12 e accountable for all aspects of the revalence of IHD and MI 8 14 eicides, with the risk of 57x47 Rafsanjan has abundant agricultural lands and CVD and 57x138 prevalence of cardiovascular risk factors (with minimum physica 57x174 et al. indicated that drivers, secretaries, or managers 57x197 disease and stroke (57x220 moderately elevated risk of incident coronary heart 57x244 among housewives, compare to those in 57x279 reported that the frequency of cardiovascular risk 57x302 matched housewives, Ainy and Azizi 57x373). In the same context, Verdejo 57x431 prevalent in pistachio farmers, in comparison with copper miners. Nonetheless, after adjustment for some potential confounders, no relationship was detected between CVDs and job type.

Some studies pointed to a relationship between job status/job exposures and CVDs (12,21). Paglione et al. in a cohort study in Rome showed significant differences in mortality by occupational status and type of job in both males and females, and CVD mortality presented higher risks (21). In their cross-sectional study of 566 working women and 561 age-matched housewives, Ainy and Azizi reported that the frequency of cardiovascular risk factors, including abnormal BMI, hypertension, and hyperlipidemia, was significantly higher among housewives, compare to those in working women (22).

Although the role of psychosocial work stress as a risk factor for cardiovascular diseases has been still under debate, work stressors, such as job strain and long working hours, were associated with a moderately elevated risk of incident coronary heart disease and stroke (23). In the same context, Verdejo et al. indicated that drivers, secretaries, or managers with minimum physical activities have a higher prevalence of cardiovascular risk factors (24). Some other studies pointed to the relationship of pesticide exposure, especially organophosphate, organelle chloride, and herbicides, with the risk of CVD and coronary heart disease (CHD) (15). Rafsanjan has abundant agricultural lands and about 88,000 hectares of pistachio orchards (18). There is a high level of exposure to pesticides, including organophosphate, organ chloride, and herbicides in Rafsanjan (25). Therefore, about 700 tons of pesticides are annually used for pistachios in this city. The results of some agricultural studies also suggested that exposure to pesticides is associated with high blood pressure as a risk factor for CVD and other related diseases (26,27). Nevertheless, no relevant association was found in the present study.

Xu et al. demonstrated that both lifestyle and sociodemographic factors were important correlates of CVDs. Moreover, they found that the incorporation of contextual factors, including environmental hazards and neighborhood characteristics measured at the county level, was useful in determining the individual-level heterogeneities in the incidence of CVD (16).

In all afore-mentioned studies, the relationship between activity status and CVDs was adjusted for cigarette smoking (28), stress (14,29), financial status (6), physical activity (8), education (6), blood pressure (11), and occupational exposures (12). In the current study, no significant relationship was observed between occupational classes and CVDs after allowance for the above-mentioned confounders. Among the notable strengths of the present study, one can refer to its large sample size and the careful allowance for a number of relevant confounders. On the other hand, the limitation of the study included the fact that some individuals who reported agricultural activities (farmers) may have been exposed to selected chemicals or may have used workers to use such chemicals. In any case, we can exclude the major role of such exposures in this dataset.

6. Conclusion

The findings of the present study indicated that after the elimination of the effect of confounding factors, there was no direct statistical relationship between activity status and CVDs.

Footnotes

Author’s contributions: F. Ayoobi was involved in designing the study, collecting the data, and drafting the manuscript for content. P. Khalili designed the study, analyzed the data, and drafted the manuscript for content. M. Mohamadi, H. Hakimi, C. Vecchia, and N. Soltani were engaged in designing the study and critically revising the manuscript for important intellectual content. A. Esmaeili-nadimi designed the study, collected the data, and drafted the manuscript for content. All authors have approved the final version of the manuscript and agree to be accountable for all aspects of the
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