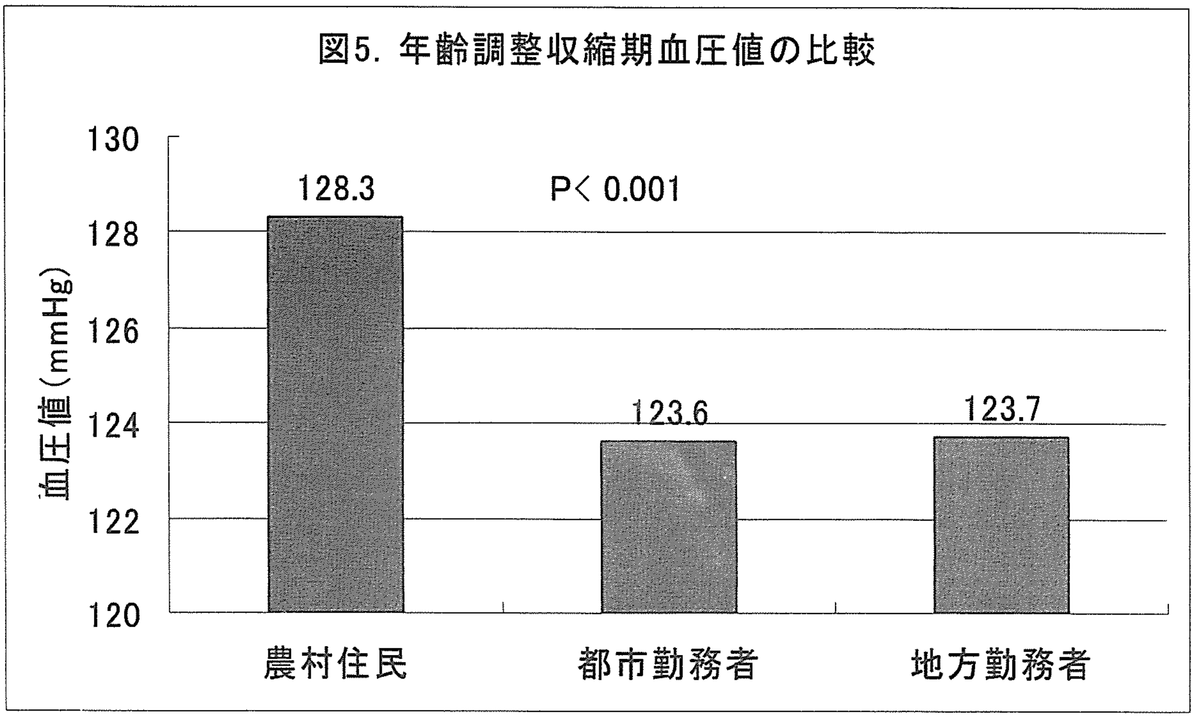


図5. 年齢調整収縮期血圧値の比較
130
128
126
124
122
120
血圧値（mmHg）
128.3
P< 0.001
123.6
123.7
農村住民
都市勤務者
地方勤務者

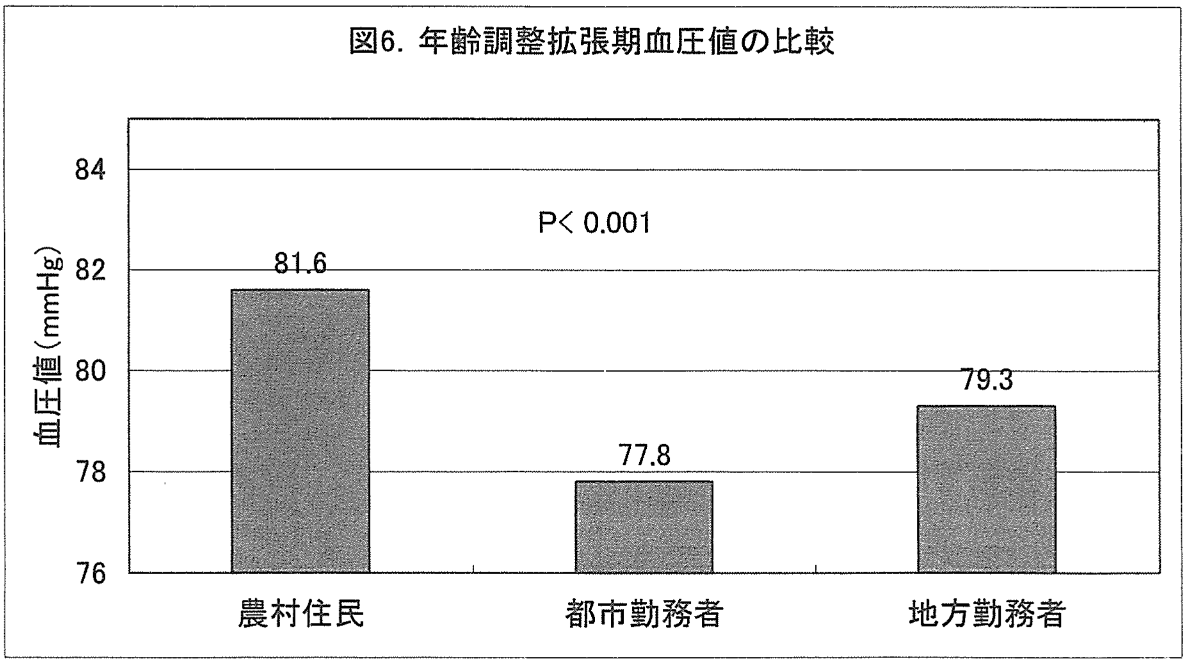


図6. 年齢調整拡張期血圧値の比較
84
82
80
78
76
血圧値（mmHg）
P< 0.001
81.6
77.8
79.3
農村住民
都市勤務者
地方勤務者

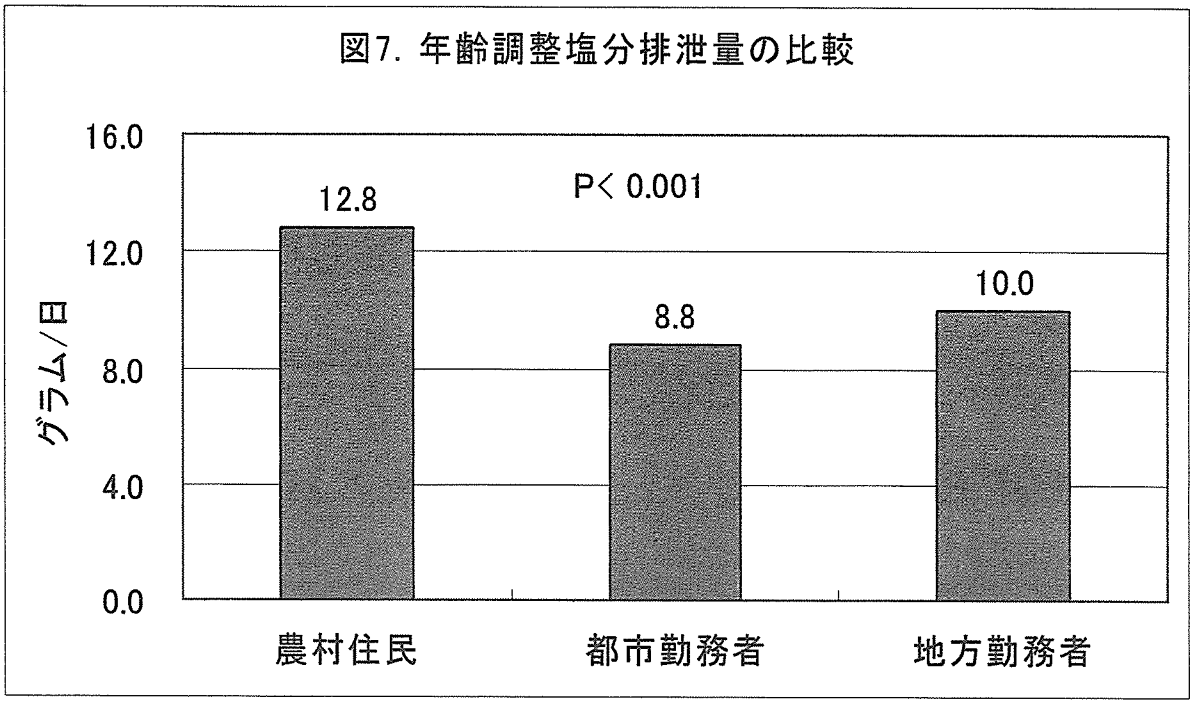


図7. 年齢調整塩分排泄量の比較
16.0
12.0
8.0
4.0
0.0
グラム/日
P< 0.001
12.8
8.8
10.0
農村住民
都市勤務者
地方勤務者

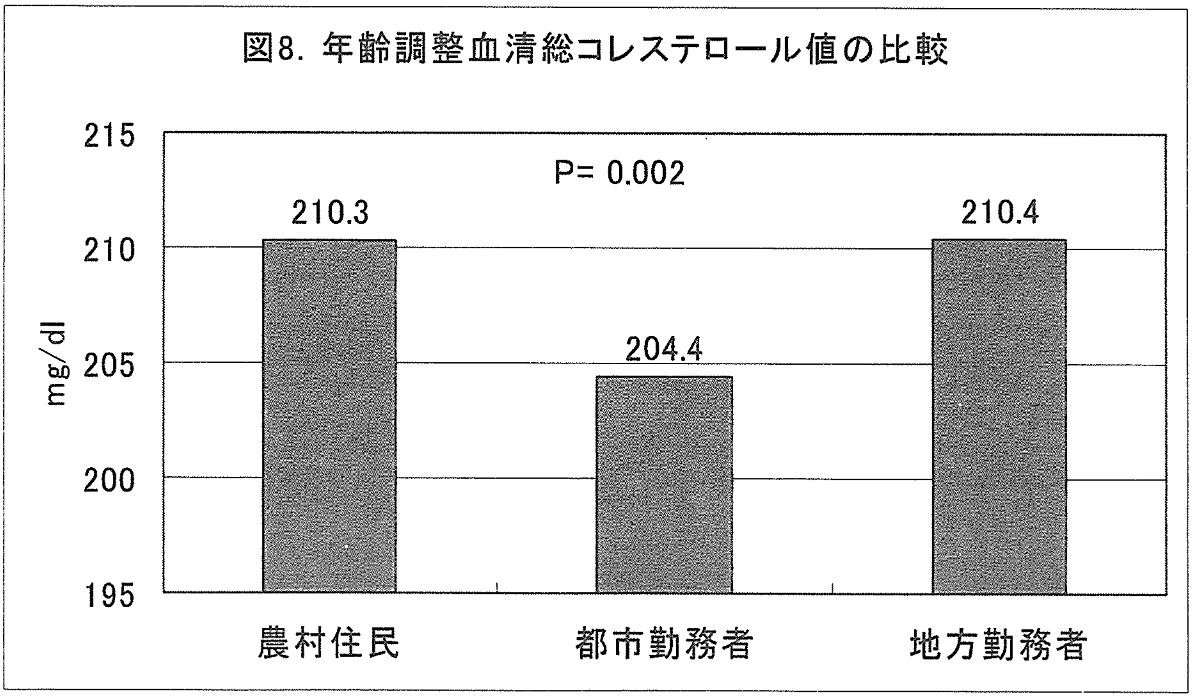


図8. 年齢調整血清総コレステロール値の比較
215
210
205
200
195
mg/dl
P= 0.002
210.3
204.4
210.4
農村住民
都市勤務者
地方勤務者

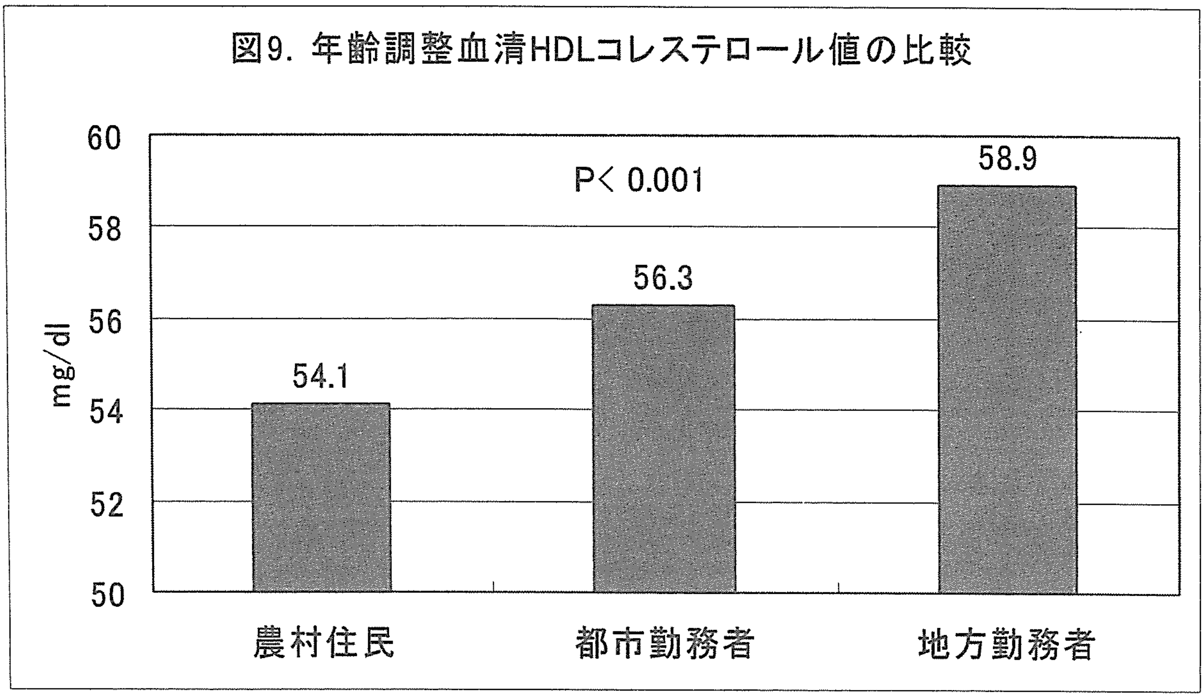


図9. 年齢調整血清HDLコレステロール値の比較
60
58
56
54
52
50
mg/dl
P< 0.001
54.1
56.3
58.9
農村住民
都市勤務者
地方勤務者

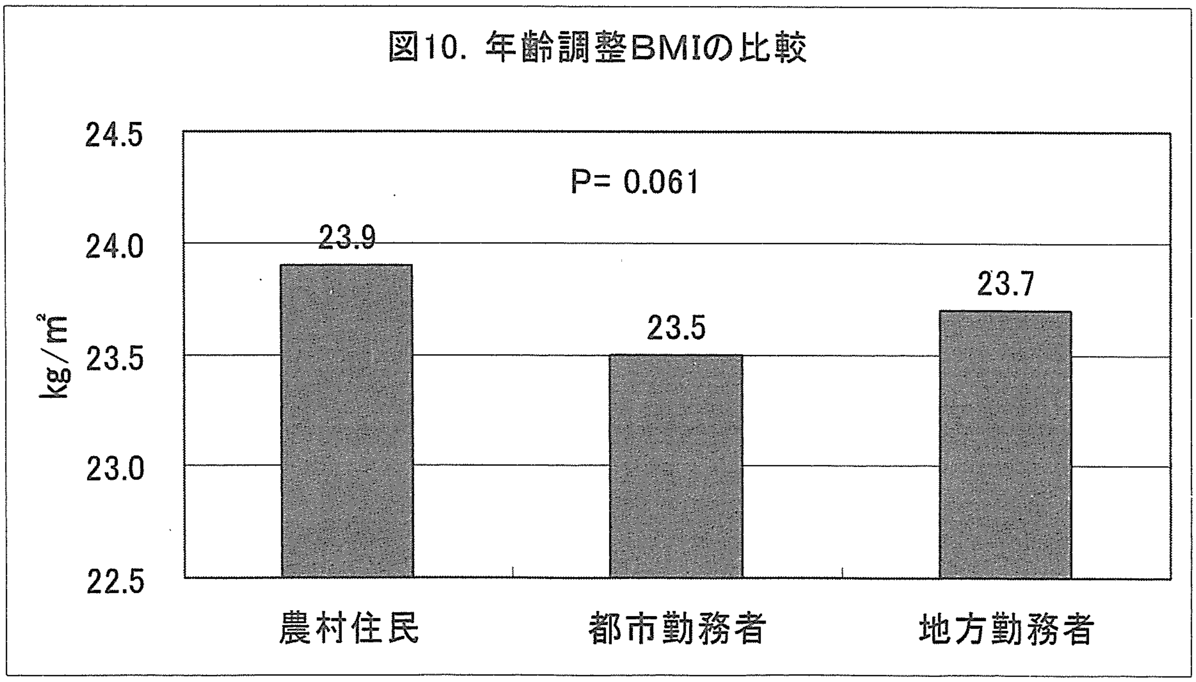


図10. 年齢調整BMIの比較
24.5
24.0
23.5
23.0
22.5
kg/m²
P= 0.061
23.9
23.5
23.7
農村住民
都市勤務者
地方勤務者

図11. 年齢調整随時血糖値(幾何平均)の比較

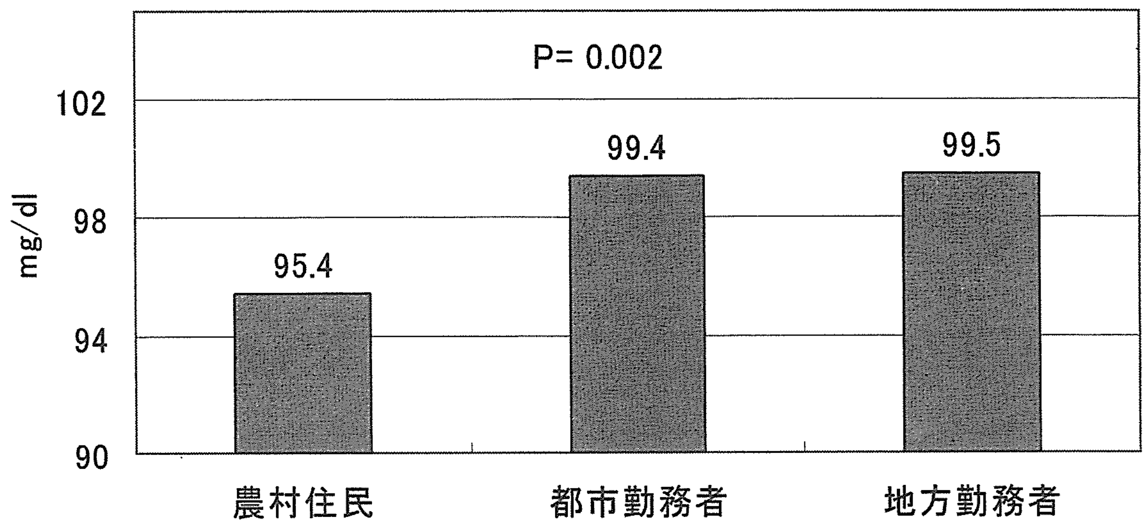


図12. 喫煙率の比較

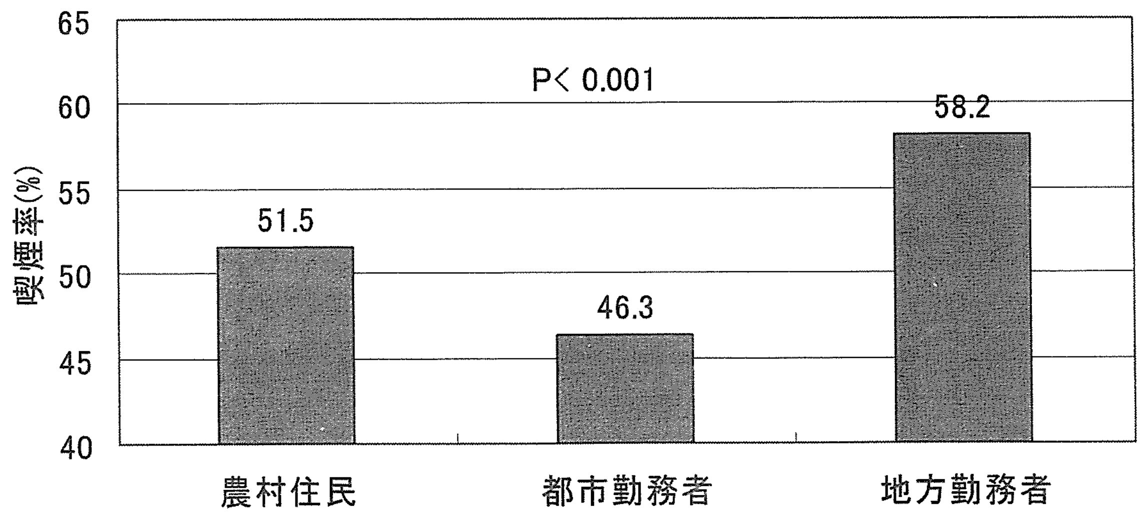


図13. 喫煙者の喫煙本数(年齢調整)の比較

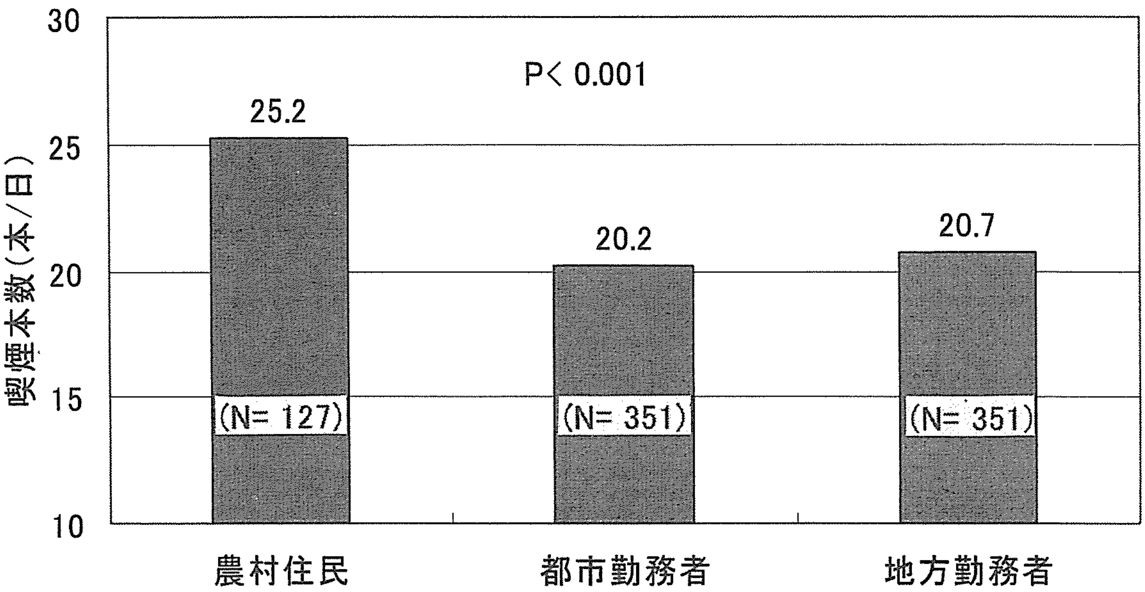
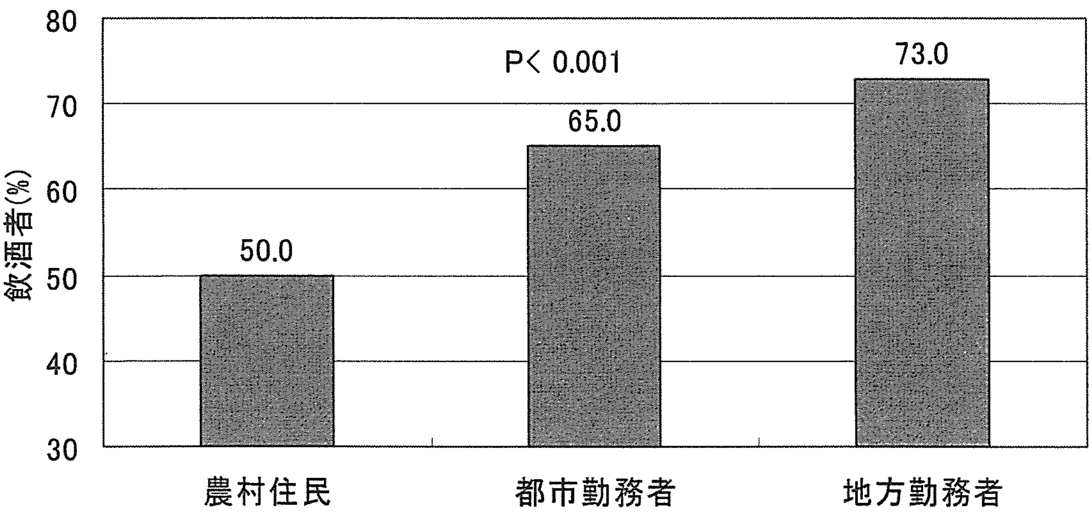


図14. 現在飲酒者の割合の比較



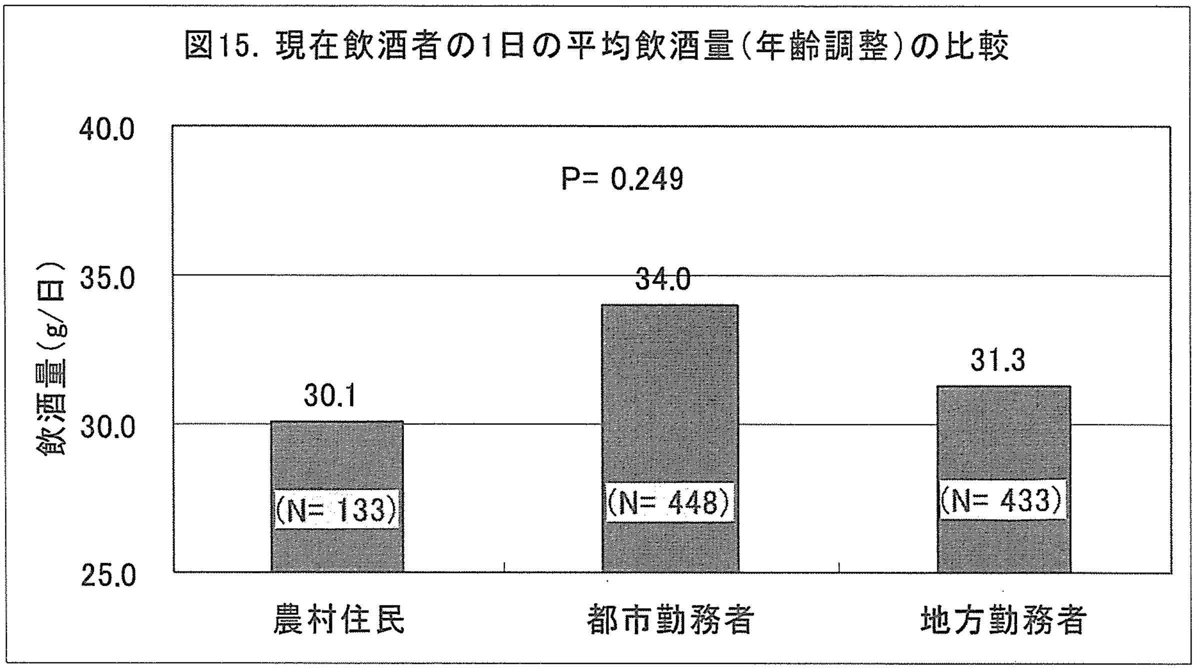


図15. 現在飲酒者の1日の平均飲酒量(年齢調整)の比較
40.0
35.0
30.0
25.0
飲酒量(g/日)
P= 0.249
30.1
34.0
31.3
(N= 133)
(N= 448)
(N= 433)
農村住民
都市勤務者
地方勤務者

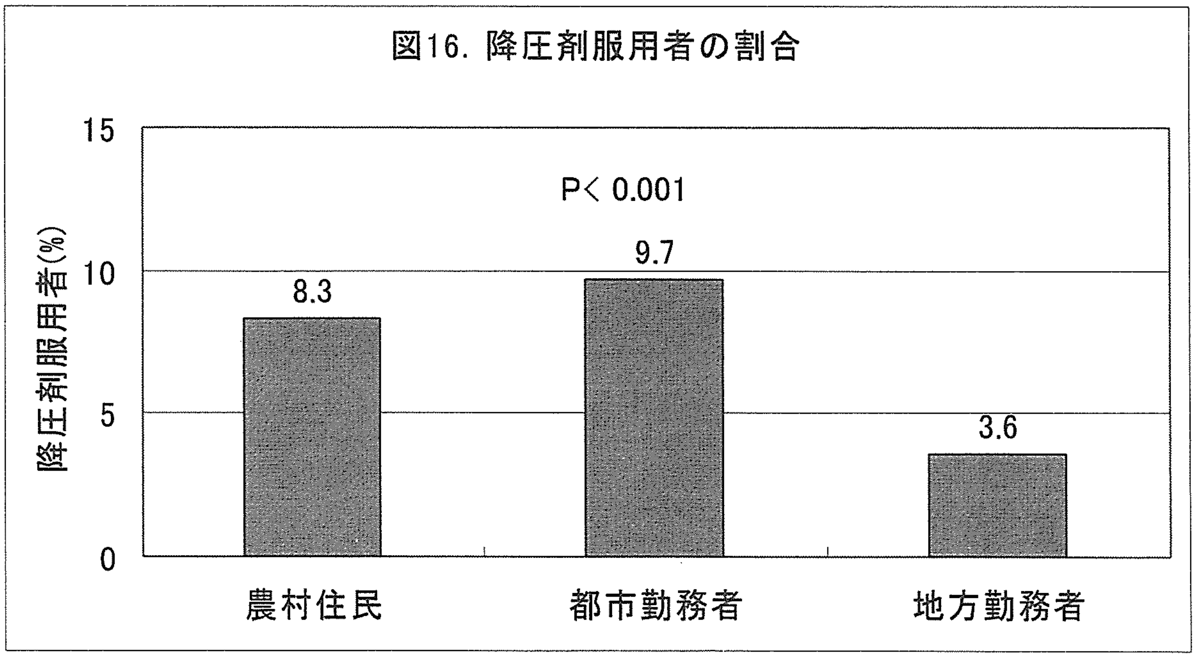


図16. 降圧剤服用者の割合
15
10
5
0
降圧剤服用者(%)
P< 0.001
8.3
9.7
3.6
農村住民
都市勤務者
地方勤務者

図17. 高コレステロール血症服薬治療者の割合

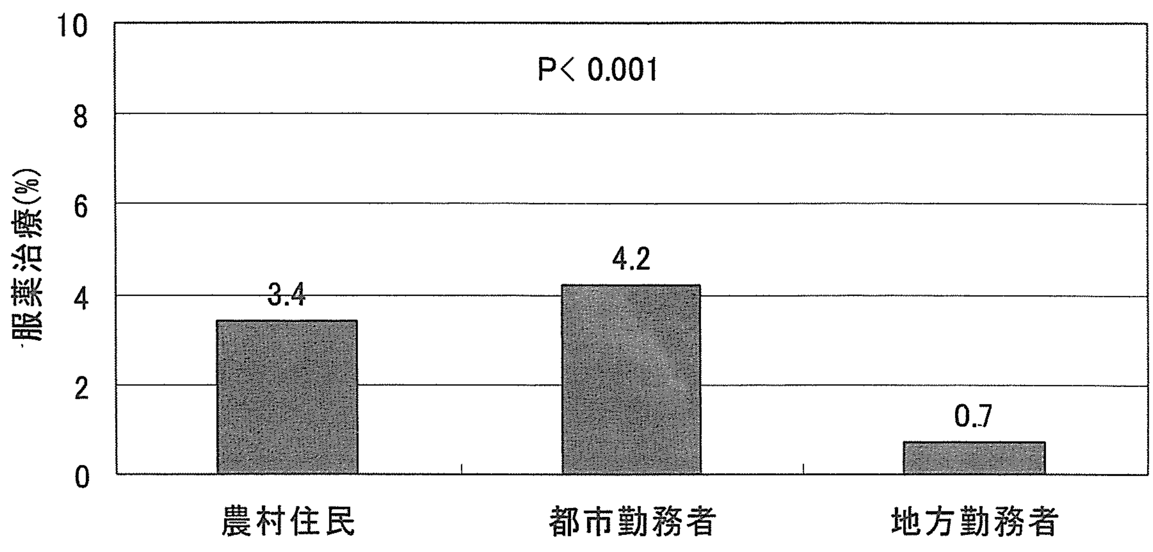
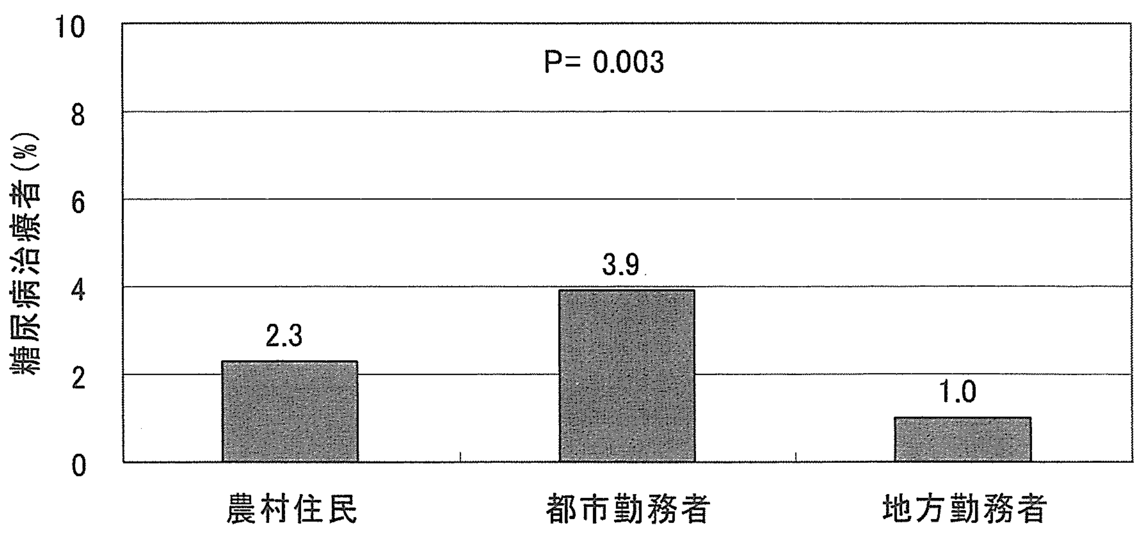


図18. 糖尿病治療者の割合



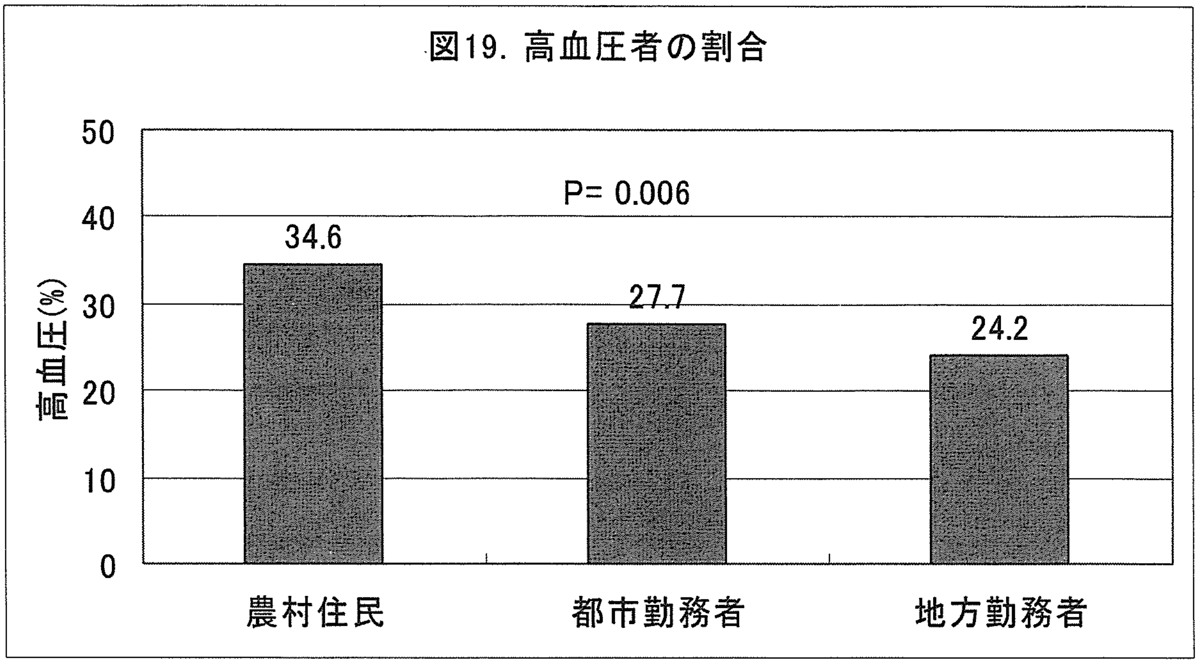


図19. 高血圧者の割合
P= 0.006
34.6
27.7
24.2
高血圧(%)
50
40
30
20
10
0
農村住民
都市勤務者
地方勤務者

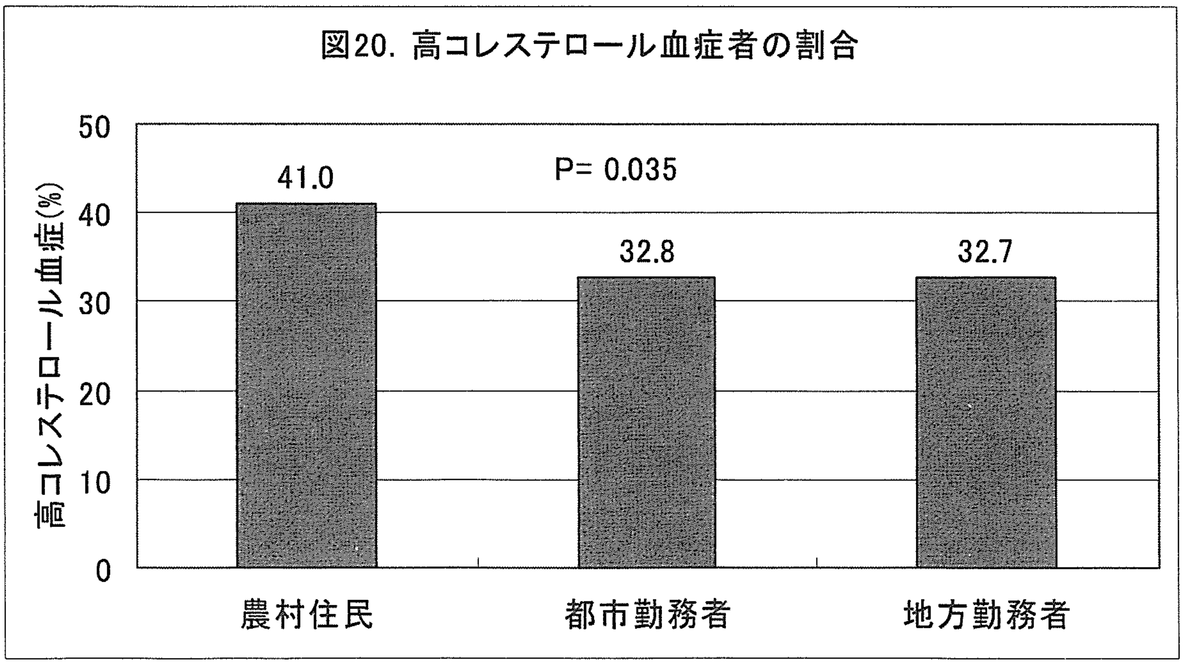


図20. 高コレステロール血症者の割合
P= 0.035
41.0
32.8
32.7
高コレステロール血症(%)
50
40
30
20
10
0
農村住民
都市勤務者
地方勤務者

図21. 耐糖能異常者の割合

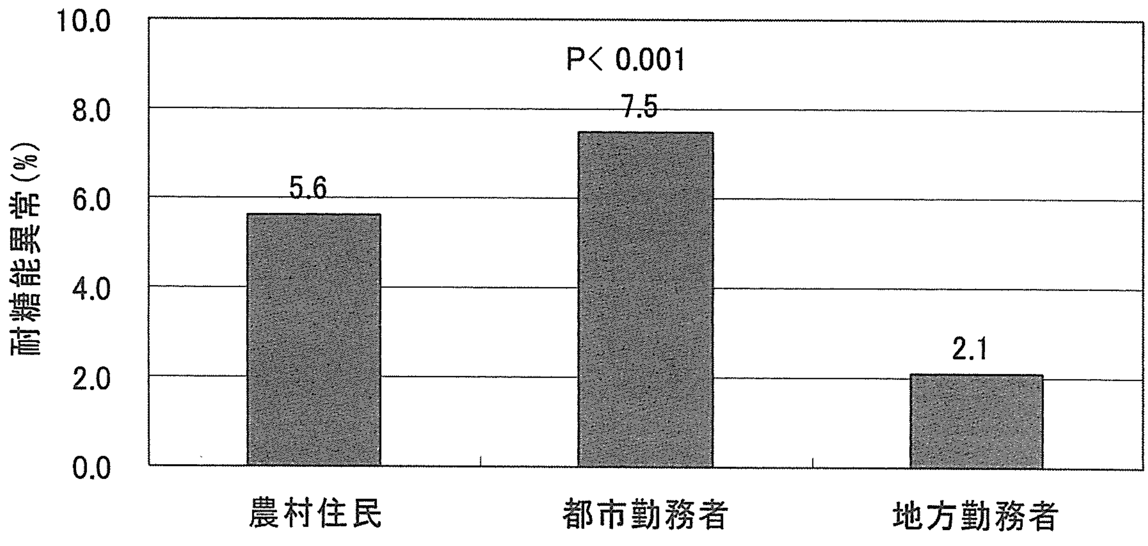


表1. 地方勤務者と比べた都市部勤務者と農村住民の収縮期血圧値の差(重回帰分析による偏回帰係数の算出)

分析モデル	集団	偏回帰係数	標準誤差	標準化係数	有意確率	決定係数 (自由度調整済み)
Model 1	農村住民	4.17	0.815	0.085	P <0.001	0.087
	都市部勤務者	−1.42	0.547	−0.043	P <0.001	
Model 2	農村住民	4.86	0.771	0.101	P <0.001	0.206
	都市部勤務者	−1.29	0.524	−0.039	0.014	
Model 3	農村住民	3.55	0.861	0.081	P <0.001	0.214
	都市部勤務者	−1.58	0.604	−0.047	0.009	

注)Model 1: 年齢調整、Model 2: 年齢、BMI、飲酒量調整、Model 3: 年齢、BMI、飲酒量、塩分排泄量調整

表2. 地方勤務者と比べた都市部勤務者と農村住民の拡張期血圧値の差(重回帰分析による偏回帰係数の算出)

分析モデル	集団	偏回帰係数	標準誤差	標準化係数	有意確率	決定係数(自由度調整済み)
Model 1	農村住民	1.54	0.560	0.042	P <0.001	0.227
	都市部勤務者	−1.42	0.376	−0.057	0.006	
Model 2	農村住民	2.09	0.529	0.058	P <0.001	0.333
	都市部勤務者	−1.27	0.359	−0.051	P <0.001	
Model 3	農村住民	2.07	0.594	0.063	0.001	0.319
	都市部勤務者	−0.98	0.417	−0.039	0.019	

注)Model 1: 年齢調整、Model 2: 年齢、BMI、飲酒量調整、Model 3: 年齢、BMI、飲酒量、塩分排泄量調整

表3. 地方勤務者と比べた都市部勤務者と農村住民の高血圧有病率オッズ比

分析モデル	集団	オッズ比	95%信頼区間	有意確率
Model 1	地方勤務者	1.00		
	農村住民	1.42	1.03, 1.96	0.031
	都市部勤務者	1.19	0.94, 1.52	0.155
Model 2	地方勤務者	1.00		
	農村住民	1.57	1.12, 2.21	0.090
	都市部勤務者	1.31	1.01, 1.70	0.040
Model 3	地方勤務者	1.00		
	農村住民	1.63	1.12, 2.39	0.013
	都市部勤務者	1.31	0.97, 1.76	0.083

注)Model 1: 年齢調整、Model 2: 年齢、BMI、飲酒量調整、Model 3: 年齢、BMI、飲酒量、塩分排泄量調整

三　部

考　察

考察

今年度は、北陸にある地方事業所の勤務者の循環器疾患危険因子の状況を把握し、既存の滋賀県T郡住民、都市部（東京、大阪近郊）の勤務者と比較した。農村部住民と勤務者の年齢構成が大きく異なるため、直接比較が可能な年齢層、すなわち 40～54 歳の範囲に絞り、平均値で示される指標についてはさらに年齢調整して比較した。その結果、農村部住民で血圧値、塩分排泄量が高く、HDL コレステロール値が低かった。また BMI も農村住民で最も大きくなっていた。一方、血糖値と飲酒率は勤務者で高かった。なお都市部と地方の勤務者同士を比較すると、塩分排泄量は地方のほうがやや高いものの両群の血圧レベルには差がなかった。また HDL コレステロールレベルは地方のほうが良好だったが、血清総コレステロールと喫煙率は都市に比し高かった。その結果、予測される将来の虚血性心疾患発症リスクは、地方勤務者を 1.00 とした場合、都市勤務者で 0.94、農村部住民で 1.54 となり、農村部住民のリスクは約 50%高いことが明らかとなった。農村部住民において勤務者よりも良好な値を示した血糖値が推計に用いた Cox 回帰係数に含まれていないという面はあるものの、このリスク差は非常に大きいと考えられる。

高血圧は循環器疾患の危険因子の中でもっとも頻度が高い要因であるが(1)、滋賀県農村部住民の血圧水準は、年齢を調整しても勤務者に比し収縮期血圧で約 5.0 mmHg 高かった。この要因の一つとして、塩分排泄量（摂取量）が、農村部住民は勤務者よりも 3～4 グラム高いことが考えられた。また、昔は都市部では総コレステロール値が高く、農村では低いことが常識であったが、今回の検討では、血清総コレステロール値はむしろ都市部勤務者でもっとも低く、農村部住民、地方勤務者でほぼ同等であった。集団における収縮期血圧の 2 mmHg の差は、脳卒中死亡率における 6 %の差をもたらすと、「健康日本 21」の報告資料にもあるように(2)、数ミリの差でも循環器疾患の発症率や死亡率に大きな影響を与える。勤務者と農村部住民の間で他の危険因子に比し血圧の差が大きいという本研究の結果から、農村住民と勤務者の循環器疾患の危険因子に格差が存在するものとあまり存在しないものとが混在していることを示している。

血清総コレステロール値は、脂肪の摂取量、とりわけ、飽和脂肪酸と多価不飽和脂肪酸の摂取割合によって影響されることがよく知られている(3)。したがって、農村部住民の血清総コレステロール値が都市勤務者より高いということは、都市住民のほうが低飽和脂肪、高多価不飽和脂肪という健康的な脂肪摂取パターンを持っていることを示唆している。さらに一方では、以前、農村部の特徴であった塩分摂取量が多い傾向が、今も滋賀県の農村部住民には残っていることも明らかとなった。したがって農村部では、今後も高血圧対策の一環として減塩の取り組みが重要な課題であり、同時に食生活の欧米化について都市部以上に注意を払う必要があると思われる。また都市勤務者に比し、喫煙率が農村部住民および地方勤務者で高かったことは、今後の非都市的地域での喫煙対策の重要性を示している。喫煙により、循環器疾患発症と死亡率が高くなることはよく知られており(4)、喫煙対策を循環器疾患対策としても積極的に進めて行く必要がある。

本研究の重要な知見として、農村部の高血圧、糖尿病、高コレステロール血症等の服薬治療率は、

都市勤務者との間で大きな差はなく、地方勤務者よりもむしろ高かったことである。これは昨年の報告でも示したように、生活習慣の改善に関する項目、即ち、食事療法や運動療法の実施者の割合が、農村部住民と勤務者で大きく異なっていたためと考えられる。このことは、医療サービスを服薬治療という点に絞れば、地域差は解消しつつあるものの、保健サービス、即ち生活指導の面における格差が存在することを示唆していると考えられる。研究対象とした都市と地方の勤務者 4 集団は、すべて東証一部上場の大企業の社員であり、地域住民に比し、社内の資源（産業医、産業看護職）を用いて生活習慣の改善指導等を受けやすいより恵まれた環境にあると思われる。また、勤務者集団は、もともと健康な労働者が働いているという選択バイアスもこの結果に影響を与えている可能性があり、ここで示した結果は、地域差というよりも“老人保健法を主体とした地域保健”と“労働安全衛生法を主体とした産業保健”の受益者の特性を反映しているのかもしれない。

しかし、いずれにしても、農村部住民における服薬治療などの純医療行為以外の保健サービスの提供体制は、都市部の事業所集団に比し劣っている可能性があり、今後、この面での改善が必要であるとの結論に変わりはない。現在、個別健康教育など地域での生活習慣病対策が実施されているが、参加率の伸び悩みや住民への浸透度の困難さという地域保健特有の問題もあり、その点を含めて抜本的な対策が必要である。現在、平成 20 年度の医療制度改革に伴い現行の地域住民を対象とした健診制度には大きな変革があると予想され、この格差を解消していくような取り組みが望まれる。特に食事療法や運動療法などの“生活習慣の改善”を農村部住民を対象として浸透させていく仕組みが必要である。

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四　部

研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Saito I, Okamura T, Fukuhara S, Tanaka T, Suzukamo Y, Okayama A, Ueshima H and the HIPOP-OHP Research Group	A cross-sectional study of alcohol drinking and health-related quality of life among male workers in Japan.	J Occup Health	47(6)	496-503	2005
岡村智教、田中太一郎、武林亨、菊池有利子、由田克士、喜多義邦、三浦克之、上島弘嗣、中川秀昭	働き盛りの農村住民、都市部勤務者の循環器疾患危険因子の比較研究	日本公衆衛生雑誌（特別付録）	52 (8)	607	2005

五　部

研究成果の刊行物・別刷

J Occup Health 2005; 47: 496–503

Journal of Occupational Health

A Cross-sectional Study of Alcohol Drinking and Health-related Quality of Life among Male Workers in Japan

Isao SAITO[1], Tomonori OKAMURA[2], Shunichi FUKUHARA[3], Taichiro TANAKA[2], Yoshimi SUZUKAMO[3], Akira OKAYAMA[4], Hirotsugu UESHIMA[2] and the HIPOP-OHP Research Group[5]

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Abstract: A Cross-sectional Study of Alcohol Drinking and Health-related Quality of Life among Male Workers in Japan: Isao SAITO, *et al.* Department of Public Health, Nara Medical University—*Background*: Although light and moderate alcohol drinkers are likely to have better subjective health, the sub-scales for subjective health have not been well documented. *Methods*: We studied 4,521 male workers aged 25 yr and older with no history of cancer or cardiovascular disease, in 12 occupational groups in Japan. Data were from the High-risk and Population Strategy for Occupational Health Promotion Study (HIPOP-OHP). Drinking status was classified according to daily alcohol intake or frequency of drinking. We assessed the health-related quality of life (HRQOL) based on scores for five scales of the SF-36. *Results*: Decreased odds ratios of sub-optimal HRQOL conditions, defined as less than the median SF-36 scores, for Role-Physical and General Health were found among persons who consumed 1.0 to 22.9 g/d of alcohol. Odds ratios for sub-optimal Vitality conditions were lowered according to increased levels of alcohol intake. Role-Emotional scores were not associated with alcohol drinking. People who drank 5 to 6 d/wk had higher levels of Role-Physical and Vitality, and those who drank 1 to 2 d/wk had better Vitality and Mental Health scores than non-drinkers. When adjusted for age, marital status, working hours, physical activity at work, self-reported job stress, smoking, regular exercise, hypertension, hyperlipidemia, and diabetes, the associations were almost unchanged except for General Health. *Conclusions*: Associations of drinking patterns with subjective health varied in five sub-scales of the SF-36. Overall, alcohol drinkers rated their health as good in comparison with non-drinkers.
(J Occup Health 2005; 47: 496–503)

Key words: Alcohol drinking, Epidemiology, Health-related quality of life, SF-36, Subjective health

It is widely known that light and moderate alcohol intake are associated with decreased risk of incident cardiovascular disease[1-3] and all-cause mortality[4-6]. The mechanism for this protective effect has been postulated to be due to the modification of high-density lipoprotein[7] and platelet aggregability[8, 9] and lowered fibrinogen levels[10].

Several epidemiological studies have indicated that people with higher levels of self-rated health[11–14] or good health practices[15, 16] are at low risk of mortality and cardiovascular disease. Moreover, a few studies have suggested that light and moderate drinkers rate their health as good[17–20]. Among Japanese employees, it was documented that men who consumed 25 to 35 or 49 g/d or more of alcohol had a significantly lower risk of self-rated ill health compared with non-drinkers[20]. This Japanese study equated ill health with the response of "poor" on the self-reported questionnaire and did not separate abstainers in the analysis, but only 4.8% of the study participants were in this category. Therefore, the inverse association might be due to a selection bias for healthy people who consumed a lot of alcohol. Furthermore, previous studies on this issue did not consider sub-scales for subjective health. So, it is important to better understand the effect of alcohol on subjective physical and mental health as measured in a health-related quality of life (HRQOL) assessment.

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The Medical Outcomes Study Short-Form 36-Item Health Survey (SF-36) is one of the generic HRQOL instruments. SF-36 is based on a conceptual model consisting of physical and mental health constructs, and it is designed to measure perceived health status and daily functioning. It consists of 36 items that are scored in the following eight domains: Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health. The score on each scale ranges from 0 to 100, with a low score indicating poor health or great disability. SF-36 is widely used and is available in many languages, including Japanese[21, 22].

In the present study, we examined the association between alcohol drinking patterns and the HRQOL among male workers, controlling for working environment, health practices, and burden of common chronic diseases.

Methods

Population

We analyzed baseline data from the High-risk and Population Strategy for Occupational Health Promotion (HIPOP-OHP) intervention study[23]. This study population consisted of 12 companies (one life insurance company, two chemical companies, one electrical appliance company research laboratory, and eight electrical appliance manufacturers). There were 5,002 male workers, aged 25 yr and over, who responded to an assessment of drinking habits at the baseline examination during 1999–2000. The response rate was 92% (5,002/5,442), and there were no differences among companies. We selected 4,521 male workers, after exclusion of those who did not reply to an answer on alcohol consumption (n=307), those who had a history of cancer or cardiovascular disease (n=96), and those who did not complete the SF-36 questionnaire (n=106). In all, 481 men were excluded from our analysis (28 overlapped) due to our exclusion criteria. Their mean age (42.4 y) was slightly higher than the mean age of the other. Adjusted for age, a higher proportion of current smokers (57.6%) and a lower proportion of those who did regular exercise (58.9%) were listed among them. However, there were no differences in proportions of married persons, daytime workers, persons with heavy physical activity at work, persons perceiving job stress, and people with obesity, hypertension, hyperlipidemia, and/or diabetes, between excluded and analyzed subjects.

Written informed consent was obtained from the subjects for individual intervention. Since the HIPOP-OHP study was designed as an occupational community-based intervention by means of population strategy, we did not think it necessary to obtain written informed consent from all individuals. However, we informed them that the data were being used in our study and individual information was strictly protected under the privacy policy. Furthermore, approval for this study was obtained from the Institutional Review Board of Shiga University of Medical Science (No. 10–16).

Measurements

In the HIPOP-OHP study, we used the same questionnaire to get health information from all companies in accordance with the common protocol described elsewhere[23]. At each company, after a 5-min rest timed with an hourglass, subjects' blood pressure was measured twice using an automatic sphygmomanometer. The mean of these two values was used. Hypertension was defined as systolic blood pressure (SBP) of 140 mmHg or higher or diastolic blood pressure (DBP) of 90 mmHg or higher. Serum gamma-glutamyl-transpeptidase activity (γ-GTP) was measured using a colorimetric method. Lipid measurements, including HDL (high-density lipoprotein) cholesterol, were standardized according to the protocol of the U.S. Cholesterol Reference Method Laboratory Network (CRMLN) of the Centers for Disease Control and Prevention to compare values among laboratories participating in the study. Subjects with hyperlipidemia and diabetes were defined as those who had ever been diagnosed by a physician, regardless of treatment status. Body mass index (BMI) was calculated using measured weight (kg) divided by the square of the height (m^2).

Each subject's drinking habits were assessed using a previously published method[24]. First, we asked them the following: "Could you choose the appropriate description of your alcohol consumption in the previous month: (1) never drank, (2) drank in the past, or (3) current drinker?" In the case of current drinkers, we asked them, "How many times per week do you usually drink alcohol? Which alcoholic beverages do you drink on a typical occasion?" and "Please describe the typical quantity of each beverage." The frequency of alcohol consumption during a week and the total alcohol intake on each occasion were determined and used to calculate the alcohol intake per week. We defined the ethanol concentration of each major alcoholic beverage as follows: beer 5%, *sake* 16%, whiskey 40%, *shochu* 25%, and wine 12%. *Happo-shu*, which has a taste and ethanol concentration similar to that of beer but includes less malt as a raw material, was calculated as beer. The ethanol concentration of other minor beverages was defined individually. This value was then divided by 7 to obtain the average alcohol intake per day. Drinkers were defined as those consuming more than 0.3 *gou* a week (1.0 g/d of ethanol), as in previous cohort studies in Japan[2, 3]. So, self-described current drinkers were re-classified as non-drinkers if they reported consuming less than 0.3 *gou* a week. The reason why we used frequency of alcohol drinking as a variable was that it was considered to be an important marker indicating drinking behavior, and the frequency itself has been significantly associated with cardiovascular disease events[1]. We classified the responses into six groups, i.e., non-drinker, ex-drinker, and four categories of current drinkers according to alcohol intake per day: 1.0 to 22.9 g, 23.0 to 45.9 g, 46.0 to 68.9 g, and 69.0 g and over. These groups correspond to the categories related to incidents of coronary heart disease and stroke among Japanese[3].

We assessed individuals' marital status, working hours, physical activity at work, self-reported job stress, smoking status, and regular exercise and added these variables to the multivariate models as confounders.

The assessment of HRQOL was done with version 2.0 of the SF-36 questionnaire form and scoring program[25]. The Japanese version of the SF-36 has been validated in previous studies[26]. Missing data were complemented in the validated algorithm of calculation. In addition, we calculated scores by the norm based scoring (NBS) method, which was set at 50 for Japanese means based on the normal distribution of the scores derived from the SF-36 national survey in 2002. The first step in the NBS consists of standardizing each SF-36v2 scale using a z-score transformation. A z-score for each scale is computed by subtracting the 2002 general Japanese population mean for each SF-36 scale and dividing the difference by the corresponding scale standard deviation from the 2002 general Japanese population. The second step involves transforming each SF-36v2 z-score to the NBS (50, 10). This is accomplished by multiplying each z-score from Step 1 by 10 and adding the resulting product to 50.

Although the SF-36 has eight sub-scales, we used only the five sub-scales of Role-Physical, General Health, Role-Emotional, Mental Health, and Vitality, because the HIPOP-OHP study basically was conducted for healthy workers without physical disability and they were mostly middle-aged or younger men; the other three sub-scales (Bodily Pain, Social Functioning, and Physical Functioning) were not investigated[23].

Higher levels of Role-Physical and Role-Emotional represent the conditions where people can work usually without physical and psychological problems, respectively. General Health is assessed by self-perceived health status; for example, "I am as healthy as anybody I know." Higher scores of Vitality indicate conditions in which people have a lot of energy or are not exhausted at all. Mental Health reflects feelings of depression, nervousness, and happiness. Each sub-scale score consisted of three to five questions in the SF-36.

Overall, the SF-36 sub-scales were divided into two domains representing physical and mental health. In a validation study of the Japanese version, Role-Physical was interpreted as a condition of physical health, and Mental Health and Vitality were valid scales representing mental health. General Health and Role-Emotional scales were not consistent with hypotheses, but the validation study suggested that General Health reflected both physical and mental conditions, and Role-Emotional was closely related to the physical component[27]. We defined sub-optimal HRQOL as less than the median score of all subjects for each SF-36 sub-scale.

To test the internal consistency reliability, we computed Cronbach's alpha for each SF-36 sub-scale. These ranged between 0.75 and 0.91. All coefficients were satisfied with criteria (>0.7) that were considered to be reliable for the use of group level comparison.

Data Analysis

Means of alcohol consumption and the frequency of drinking were computed by the levels of alcohol consumption. Also, we calculated the proportions of married persons, daytime workers, persons with heavy physical activity at work, persons perceiving job stress, current smokers, those who did regular exercise, and people with obesity, hypertension, hyperlipidemia, and/or diabetes. Means of scores of the original SF-36 and the NBS by sub-scales and standard deviations were computed by drinking status.

Age-adjusted and multivariate logistic models were done. The risk of sub-optimal HRQOL based on SF-36 was calculated according to alcohol consumption and frequency of alcohol drinking in comparison with non-drinkers. The odds ratios were adjusted for age in model 1. In model 2, marital status (married, other), working hours (daytime, other), physical activity at work (heavy, other), self-reported job stress (yes, no), smoking status (current smoker, other), and regular exercise (yes, no) were added using dummy variables. Finally, we added factors indicating obesity, hypertension, hyperlipidemia, and diabetes to model 2. This became model 3. All analyses were done using SAS software, version 8.2 (SAS Institute, Inc., Cary, North Carolina).

Results

Among 4,521 male workers (mean age, 39.4 y), 60.4% were current drinkers. Table 1 shows the characteristics of our subjects by group. Frequency of drinking increased as the amount of alcohol consumption increased. Compared to non-drinkers and ex-drinkers, subjects who consumed the lowest amount of alcohol had better health practices, i.e., lower prevalence of smoking and higher proportion of regular exercise. High percentages of obesity and diabetes were seen among ex-drinkers. Means of HDL-cholesterol were clearly elevated in accordance with alcohol consumption levels. People who reported consumption of 1.0 to 22.9 g/d of alcohol had higher scores in the areas of Role-Physical, whereas ex-drinkers tended to have low scores, especially in General Health. Vitality scores were higher among men who drank more. The NBS scores by sub-scales are presented.

Table 1. Population characteristics by alcohol consumption among male workers in the HIPOP-OHP Study

Variables	Non-drinker	Ex-drinker	Current drinkers by alcohol consumption, g/d			
			1.0–22.9	23.0–45.9	46.0–68.9	69.0 and over
Number, n	1,497	291	1,408	703	359	263
Mean age, y	37.8	39.0	38.6	41.3	43.4	42.5
Mean (SD§) alcohol consumption, g/d	–	–	12.1 (5.8)	33.2 (6.5)	54.8 (6.2)	93.6 (26.0)
Frequency of alcohol drinking, d/wk	–	–	4.0	5.8	6.4	6.6
Married, %	67.1	72.0	76.7	79.6	83.4	83.0
Working hours, % daytime	60.3	61.9	73.3	69.5	71.3	61.1
Physical activity at work, % heavy	6.9	9.4	6.3	8.6	9.0	6.6
Self-reported job stress, % yes	22.6	23.0	22.5	24.3	23.5	21.5
Current smokers, %	49.3	56.8	46.3	59.8	60.7	71.4
Regular exercise, %	58.9	60.2	64.7	64.5	66.1	56.9
Obesity*, %	23.6	30.9	20.5	19.8	24.2	26.6
Hypertension**, %	10.2	16.8	13.7	15.3	24.3	19.9
Hyperlipidemia†, %	12.6	13.8	11.1	14.6	15.7	16.4
Diabetes†, %	4.8	10.4	5.3	6.3	7.6	7.7
Mean HDL-cholesterol‡ (SD§), mg/dL	52.2 (12.6)	51.9 (12.5)	55.7 (13.6)	59.0 (13.9)	59.0 (13.4)	60.3 (14.9)
Mean SF-36 scores (SD§) by scales						
Role-Physical	86.6 (19.1)	83.6 (21.0)	89.0 (17.2)	86.5 (20.0)	87.6 (17.8)	87.4 (18.8)
General Health	58.2 (16.9)	54.9 (15.2)	60.3 (16.3)	59.4 (16.2)	57.9 (15.9)	60.6 (16.6)
Vitality	52.2 (18.9)	52.3 (17.5)	53.9 (18.2)	54.5 (17.8)	55.7 (18.3)	56.4 (18.9)
Role-Emotional	85.8 (20.0)	84.4 (21.6)	87.5 (18.0)	86.3 (19.7)	87.0 (18.6)	87.2 (19.2)
Mental Health	65.4 (17.3)	64.7 (17.1)	66.8 (16.8)	66.0 (17.3)	65.9 (17.6)	67.0 (17.1)
Mean SF-36 NBS scores‖ (SD§) by scales						
Role-Physical	48.9 (10.4)	47.3 (11.5)	50.2 (9.4)	48.9 (10.9)	49.5 (9.7)	49.4 (10.2)
General Health	46.9 (9.1)	45.1 (8.2)	48.0 (8.8)	47.5 (8.7)	46.7 (8.6)	48.2 (8.9)
Vitality	45.2 (9.3)	45.2 (8.6)	46.0 (8.9)	46.3 (8.8)	46.9 (9.0)	47.3 (9.3)
Role-Emotional	49.3 (10.2)	48.6 (11.0)	50.2 (9.2)	49.6 (10.0)	50.0 (9.5)	50.0 (9.8)
Mental Health	46.7 (9.2)	46.3 (8.9)	47.4 (8.9)	47.0 (9.2)	46.9 (9.4)	47.5 (9.1)

*Defined as body mass index ≥25 kg/m². **Defined as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or current use of antihypertensive medication. †Defined as those who had been told by doctors. ‡Data were available for 3,310 subjects. §Standard deviation. ‖NBS (Norm-based scoring) scores, which were set at 50 as Japanese means, were based on the total distribution from the SF-36 national survey[25].

Compared with Japanese means, which were set at 50, our population of SF-36 means in each sub-scale were below 50.

Age-adjusted and multivariate odds ratios, according to daily consumption of alcohol, for sub-optimal health are shown by SF-36 sub-scales in Table 2. The age-adjusted odds ratio for General Health was 1.69 (95% confidence interval, 1.29–2.20) in ex-drinkers. The group that consumed 1.0 to 22.9 g/d of alcohol had a low risk for sub-optimal scores in Role-Physical, General Health, and Vitality. Those for Vitality were lowered in accordance with increasing levels of alcohol intake. Among those who reported heavy drinking (69.0 g/d and over), the odds ratio did not increase at all. In models 2 and 3, after addition of confounding factors, alcohol drinkers who consumed 1.0 to 22.9 g/d were more likely to have a good HRQOL; however, the odds ratio for General Health was not statistically significant after the adjustment. Inverse association of alcohol consumption with Vitality scores still remained significant in models 2 and 3.

Table 3 shows age-adjusted and multivariate odds ratios for sub-optimal HRQOL by the frequency of alcohol drinking per week. Alcohol consumption levels by four drinking frequency categories corresponded with 9.9, 18.7, 30.8, and 45.8 g/d. Individuals who consumed alcohol 1 to 2 d/wk had higher HRQOL levels for General Health, Vitality, and Mental Health, and those who consumed alcohol on 5 to 6 d/wk were in good condition as determined by Role-Physical. People who drank alcohol 3 to 4 or 5 to 6 d/wk had good HRQOL Vitality scores. When the odds ratios were adjusted for several factors in models 2 and 3, the association was almost the same.