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A decline in the prevalence of angina pectoris: Data from the Nutrition and Health Survey in Taiwan☆

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ABSTRACT

Background: Angina pectoris (AP) is one of common symptoms of heart disease. The prevalence of AP varies by genders, age and ethnics. This study aimed to estimate the AP prevalence in adults and its change between surveys.
Methods: Data was derived from the Nutrition and Health Survey in Taiwan (NAHSIT) between 1993 and 1996, and between 2005 and 2008. Participants aged ≥19 years old and grouped according to sex and age range (19–44.9, 45–64.9, and ≥65 years). The national weight prevalence rates in three types of AP (possible, definite, and confirmed) were estimated and we also estimated its change between surveys.
Results: A total of 5031(1993–1996) and 4686 (2005–2008) adults were enrolled for this study. The aged-adjusted prevalence of possible, definite, and confirmed AP was 9.2%, 5.6%, and 2.1%, respectively, in 1993–1996, and 4.7%, 3.5%, and 1.1%, respectively, in 2005–2008. The age-adjusted prevalence of definite AP significantly declined from 5.6 (1993–1996) to 3.5 (2005–2008). Women had greater decline in the prevalence for possible (5.8% vs. 3.2%), definite (2.9% vs. 1.3%) and confirmed (1.6% vs. 0.5%) AP than men in both surveys. All AP prevalence rates increased by age in men in both surveys, however, the positive association between AP prevalence and age groups among women only was in 1993–1996.
Conclusions: The AP prevalence significantly declined from 1993 to 1996 to 2005–2008. The AP prevalence in women was higher. The prevalence increased with age in men, but not in women. Continuous monitoring of AP prevalence is recommended to better understand the disease burden.

1. Introduction

Angina pectoris (AP) is a common clinical presentation of coronary artery disease (CAD), mostly resulting from coronary atherosclerosis, and sometimes from non-CAD causes such as heart failure, anemia, and hyperthyroidism [1]. The World Health Organization (WHO) estimated that there were 54 million AP patients globally in 2014, mainly located in Europe and Southeast Asia. AP has been classified as a moderate disability [2] that lowers the quality of life and hampers the ability to work, increases medical and social costs [3], and significantly increases the incidence of cardiovascular disease by 1.5 times [4].

Understanding the burden and ranking of disease facilitates evaluating the effectiveness of population-based interventions, helping policymakers to allocate healthcare resources [5]. Population-based studies can reflect the true prevalence of a disease in a population more accurately than hospital-based studies. Evaluating self-reported symptoms using questionnaires to investigate AP prevalence is the most common and economical approach, and the WHO has recommended the Rose Angina Questionnaire for community screening to evaluate AP prevalence [6].

AP prevalence rates vary widely according to ethnicity, sex, age, and generations. A meta-analysis of 74 reports from 31 countries showed that the risk of AP was significantly higher in women (6.7%) than in men (5.7%) [3], and the National Health and Nutrition Examination Survey (NHANES) found that AP prevalence was higher among older

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participants. Moreover, AP prevalence from 1971 to 1994 slightly increased [5] but decreased nearly 50% from 1988 to 2012 [7].

Taiwan is one of the countries with a rapidly aging population, and cardiovascular disease increases with aging [8]. In Taiwan, there have been only three community surveys targeting specific regions and participants to investigate AP prevalence over the past 10 years [9–11], and the national figures for AP prevalence in Taiwan are lacking.

Therefore, we used the Nutrition and Health Survey in Taiwan (NAHSIT) 1993–1996 and 2005–2008 data to investigate the prevalence of AP in Taiwanese adults and compare changes among different sex, age, and generation groups. Moreover, because the different AP definitions may cause difficulty in comparing, we also provided the possible, definite and confirmed AP prevalence.

2. Methods

2.1. Data sources and study population

The NAHSIT was designed for investigating the distribution of nutrients and the frequency of foods among a national representative sample, and for investigating the association between nutrients/foods and health. The NASHIT surveys were cross-sectional in design and conducted between 1993 and 1996, and between 2005 and 2008.

The 1993–1996 NAHSIT used multi-stage, stratified, and clustered sampling, dividing 359 townships into 7 strata. The participants were aged >4 years. A total of 9962 people were sampled, and the participation rate for face-to-face interviews was 74%, of which 65% of interviewed participants underwent a medical examination [12,13]. This study targeted adults aged ≥19 years. A total of 5031 people were interviewed and 3160 underwent physical examinations.

The 2005–2008 NAHSIT used stratified three-staged probability sampling. Four sets of samples were selected from 358 townships. The participants were aged <6 and ≥19. A total of 6189 people were sampled based on six age group strata and sex. The participation rate for face-to-face interviews was 65%, of which 59% of the interviewed participants underwent medical examinations [13,14]. A second study targeted people aged ≥19. A total of 4686 were interviewed and 2808 underwent physical examinations.

The two surveys had a similar data collection processes, which have previously been reported [12,14], and the trends and changes of disease or behaviors between these two surveys were published in the prior studies [15,16].

Following approval by the Institutional Review Board (IRB No. 104-9035B), this study applied to the survey center to download data. Released data included the original questionnaires, codebooks, data files after checking for unreasonable values, and weight data files. As multi-stage sampling was used in NAHSIT, the survey center calculated "questionnaire weight" and "physical examination weight" using the statistical software SUDAAN (SUrvey Data ANalysis) to infer the results nationally [13].

2.2. Defining angina pectoris (AP)

The WHO recommended the Rose Angina Questionnaire for community screening to evaluate AP prevalence. It has a sensitivity of between 20% and 80% and a specificity of between 80% and 95% compared to clinical diagnosis, exercise electrocardiography, a myocardial perfusion scan, and coronary angiography [17]. A shorter version of the questionnaire with three questions has similar validity to the original questionnaire [6].

In our study we used the Rose Questionnaire to identify the subjects with AP. Both NAHSIT surveys used the same nine-question AP questionnaire adapted from the Rose Questionnaire. As this study aimed to investigate AP prevalence, occurrence frequency and age at first occurrence were not considered. Previous studies have defined an AP attack duration of <10 min; however, our questionnaire did not seek information on the duration of an AP attack. Therefore, our definition of AP does not include the AP duration time [11,18]. This study used five questions for AP determination, and classified AP into three types: possible, definite, and confirmed. Two questions were initially posed: "Have you ever felt chest pain/discomfort?" and "Do you feel chest pain/discomfort when climbing a hill or walking quickly on flat ground?" If the responses were positive, the following three criteria were evaluated: 1. I slow down or stop when feeling chest pain/discomfort; 2. This chest pain/discomfort disappears when I stand still; 3. The pain/discomfort is in a specific part of the chest. Participants meeting all criteria were considered to have definite AP, or otherwise possible AP. Participants with definite AP and self-reported physician-diagnosed heart disease or regular use of heart disease medications over the past month were classified as having confirmed AP [19].

2.3. Defining relative factors

Baseline participant characteristics included demographics, employment, cigarette smoking, alcohol consumption, and medical history. Non-menstruating participants or those beginning menopause were classified as "menopausal." Participants having full- or part-time jobs were considered to be "working." Participants were defined as "never having smoked" if they had smoked fewer than 100 cigarettes in their lifetime, "previously smoked" if they had smoked >100 cigarettes but had stopped smoking, or "currently smoking" if they were currently smoking occasionally or daily. Participants were defined as "never having consumed alcohol" if they had never drunk alcohol or had only drunk alcohol once or twice, or "frequently consumed alcohol" if they self-reported as drinking alcohol or drinking >once a week. The remainder was classified as "occasional consumers of alcohol." Any history of self-reported doctor-diagnosed disease was used for disease history. A medical history included self-reported medication taken regularly over the preceding month.

Measurements and test values were derived from physical examination data in relation to body mass index (BMI), defined as weight (kg)/height (meter)^2, and a waist hip circumference ratio (WHR), defined as waist circumference/hip circumference. The Ministry of Health and Welfare of Taiwan has identified the following five risk factors, and people with ≥3 of them are determined as having metabolic syndrome, namely: (1) abdominal obesity: waist circumference; male, ≥90 cm; female, ≥80 cm; (2) hypertension: systolic pressure ≥130 mm Hg/diastolic pressure ≥85 mm Hg, or using antihypertensive medication; (3) hyperglycemia: fasting blood glucose level ≥100 mg/dl, or using hypoglycemic medication; (4) low high-density lipoprotein-cholesterol (HDL-C): male <40 mg/dl, female <50 mg/dl, and; (5) high triglyceride (TG) ≥150 mg/dl [20].

2.4. Statistical analysis

The statistical software SAS 9.3 (SAS Institute Inc., Cary, NC, USA.) was used for analysis. The characteristics of the study population were surveyed between 1993 and 1996 and 2005–2008. The AP prevalence was estimated in two surveys according to three definitions (possible, definite and confirmed), gender, and three age groups (19–45, 45–65, ≥65 years old). The AP prevalence was presented both as crude, national weighted data and WHO aged-standardization. The WHO aged-standardized AP prevalence was according to the WHO's standard population distribution for 2000–2025 [21]. The comparison of prevalence among groups was assessed by a chi-squared test and further comparisons were conducted with a Bonferroni. Post-hoc correction was used to control for type I errors. Logistic regression was conducted to evaluate the difference in AP prevalence between the two surveys in multivariable models adjusted for demographics and disease histories. A two-tailed test was used with a statistical significance of $p < 0.05$.

3. Results

The participants showed significant differences in terms of age, region, marital status, and education between the two surveys (Table 1). Additionally, we have included the participant attributes from each of the surveys (Appendix A). Table 2 shows that crude and age-adjusted prevalence were generally similar, and that weight prevalence was lower than crude or age-adjusted prevalence. The overall age-adjusted AP prevalence (possible, definite, and confirmed) was 9.2%, 5.6%, and 2.1%, respectively, in the period 1993–1996 and 4.7%, 3.5% and 1.1%, respectively, in the period 2005–2008. The AP percentages

Table 1
Demographic characteristics of the 1993–1996 and 2005–2008 NAHSIT surveys.

	1993–1996 (n = 5031)	2005–2008 (n = 4686)	p
	% (n)	% (n)	
Sex			0.864
Male	49.6 (2496)	49.8 (2333)	
Female	50.4 (2535)	50.2 (2353)	
Age (years)			<0.001
19–44.9 years	40.8 (2052)	33.5 (1572)	
45–64.9 years	39.1 (1967)	33.2 (1558)	
≥65 years	20.1 (1012)	33.2 (1556)	
Ethnicity			0.120
Hokkien	55.4 (2783)	57.3 (2685)	
Hakka	21.8 (1094)	20.3 (951)	
Other	22.8 (1145)	22.4 (1050)	
Region			<0.001
Northern	42.4 (2131)	37.8 (1773)	
Central and southern	14.7 (738)	25.1 (1174)	
East offshore island	42.9 (2162)	37.1 (1739)	
Marital status			<0.001
Unmarried	11.7 (588)	14.2 (665)	
Married	76.8 (3865)	67.9 (3184)	
Other	11.5 (578)	17.9 (837)	
Education			<0.001
Below elementary (inclusive)	56.4 (2835)	41.0 (1922)	
Junior/senior high	33.5 (1687)	40.4 (1891)	
University or above	10.1 (507)	18.6 (873)	

Table 2
Comparison of overall age-adjusted AP prevalence in 1993–1996 and 2005–2008 according to sex.

	1993–1996			2005–2008			2005 vs. 1993	
	n/total	C% (W%)	Age-adjusted% (95% CI)	n/total	C% (W%)	Age-adjusted% (95% CI)	Age-adjusted difference %	Decrease %
Possible								
Male	175/2496	7.0 (4.7)	6.8 (5.9–7.8)	83/2333	3.6 (3.1)	3.6 (3.0–4.2)	3.2	47.1
Female	303/2535	12.0 (8.3)	11.6 (10.4–12.8)	138/2353	5.9 (5.6)	5.8 (5.0–6.5)	5.8	50.0
All	478/5031	9.5 (6.5)	9.2 (8.4–10.0)	221/4686	4.7 (4.4)	4.7 (4.2–5.2)	4.5	48.9
p		<0.001	<0.001		<0.001	<0.001		
Definite								
Male	102/2496	4.1 (2.8)	4.0 (3.3–4.8)	62/2333	2.7 (2.1)	2.7 (2.2–3.2)	1.3	32.5
Female	188/2535	7.4 (5.0)	7.1 (6.1–8.1)	99/2353	4.2 (4.0)	4.2 (3.5–4.9)	2.9	40.8
All	290/5031	5.8 (3.9)	5.6 (4.9–6.2)	161/4686	3.4 (3.1)	3.5 (3.0–3.9)	2.1	37.5
p		<0.001	<0.001		<0.001	0.001		
Confirmed								
Male	38/2496	1.5 (0.9)	1.5 (1.0–1.9)	20/2333	0.9 (0.6)	1.0 (0.6–1.3)	0.5	33.3
Female	79/2535	3.1 (1.3)	2.8 (2.1–3.4)	27/2353	1.2 (0.7)	1.2 (0.8–1.6)	1.6	57.1
All	117/5031	2.3 (1.1)	2.1 (1.7–2.5)	47/4686	1.0 (0.6)	1.1 (0.8–1.3)	1.0	47.6
p		<0.001	0.001		<0.001	0.316		

AP: Angina Pectoris; C: crude AP prevalence; W: weighted AP prevalence; CI: confidence interval.

decreased by 48.9%, 37.5%, and 47.6% from the period 1993–1996 to the period 2005–2008 ($p < 0.05$), with age-adjusted prevalence decreases of between 32.5% and 47.1% in men and between 40% and 57.1% in women from the period 1993–1996 to the period 2005–2008 ($p < 0.001$). The age-adjusted prevalence in women was between 1.3 and 1.9 times that in men.

Appendix Table 2 shows the crude and weighted prevalence in the surveys in terms of age and sex. The 1993–1996 survey showed that age-adjusted prevalence increased with age, regardless of sex ($p < 0.001$). Similarly, the 2005–2008 survey showed that age-adjusted prevalence in men increased with age ($p < 0.05$). However, there was no such consistent change identified in women. Women aged between 19 and 44.9 years had the highest age-adjusted prevalence of possible and definite AP. When comparing differences in prevalence in the surveys in terms of age and sex, the population aged between 19 and 44.9 years showed no significant change, regardless of sex ($p > 0.05$). Those aged between 45 and 64.9 years and those aged ≥65 showed a significant decline (Appendix Table 3 and Fig. 1). The decline in age-adjusted prevalence in the period 2005–2008 mainly occurred among the population aged >45 years when compared with the prevalence in the period 1993–1996.

The AP prevalence was higher in the 1993–1996 survey than in the 2005–2008 survey based on crude analysis and in the multivariable model adjusted for demographics (Model 1) and disease histories (Model 2) (Table 3). The AP prevalence between two surveys remains significantly different.

4. Discussion

This study aimed to investigate AP prevalence and its changes. The results showed that the definite age-adjusted prevalence in the period 2005–2008 was 3.5%, with a 37.5% decrease from the period 1993–1996. The prevalence in women was 1.6 times that of men. The prevalence in men increased with age, which was not the case for women.

The overall definite AP weight prevalence (3.1%) in the 2005–2008 survey was used to estimate the total AP patient population in Taiwan more accurately. Based on the total population in Taiwan [22], there are approximately 550,000 people with the symptomatic burden of definite AP each year.

4.1. Interpreting the results in light of previous studies

Calculating AP prevalence with different definitions facilitates comparison with previous studies. The Study on global AGEing and adult health (SAGE) showed that the prevalence of definite AP was higher than that of confirmed AP (10% vs. 7.9%) [23]. A national primary care sample survey in Spain showed that the prevalence of definite AP was 1.9 times that of confirmed AP (2.6% vs. 1.4%) [18], similar to the results

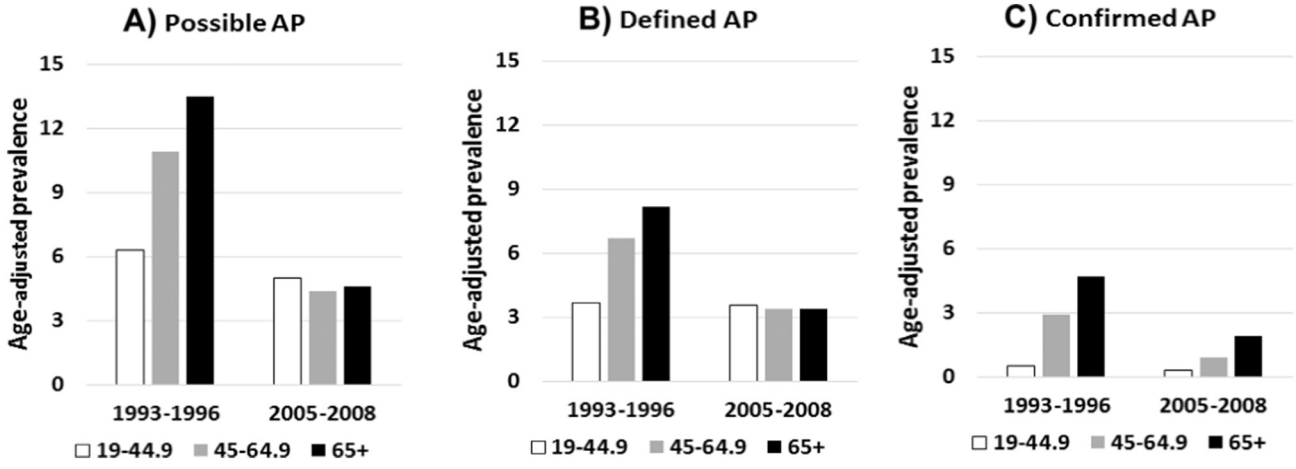

Fig. 1. The age-adjusted AP prevalence between the two surveys, stratified by differential definitions, including (A) possible AP, (B) defined AP, and (C) confirmed AP.

Table 3
The decline of AP prevalence in crude analysis and in multivariable models.

	Possible AP (event = 699)		Definite AP (event = 451)	
	Odds ratio	95% confidence intervals	Odds ratio	95% confidence intervals
Crude				
1993–1996 vs. 2005–2008	1.92	1.59–2.40	1.74	1.35–2.24
Model 1				
1993–1996 vs. 2005–2008	2.01	1.61–2.50	1.80	1.38–2.35
Model 2				
1993–1996 vs. 2005–2008	2.03	1.61–2.55	1.77	1.34–2.33

Model 1. Adjusted demographic characteristics, including age, sex, ethnicity, regions, marital status, and education.
Model 2. Adjusted demographic characteristics and smoking, drinking, and disease histories.

of this study. In this study although a history of self-reported doctor-diagnosed heart disease or regular use of heart disease medication was not limited to CAD, the prevalence of definite AP remained at between 2.5 and 3 times that of confirmed AP, which may be related to a low treatment rate of AP patients or a low proportion of disease identification/diagnosis by physicians. As self-reported diagnosis/treatment tends to underestimate prevalence, the addition of highly suggestive symptoms is recommended for an expanded measurement of prevalence to better reflect the actual situation [24]. Therefore, this study used the prevalence of definite AP to estimate the population that may be affected.

There is a declining trend of AP prevalence among the populations not only in Taiwan, but also in other countries. The overall age-adjusted definite AP prevalence in 2005–2008 was 3.5% in Taiwan, which is similar to the 3.3% overall AP prevalence in adults aged >20 in 2012 reported by the American Heart Association (AHA) [25]. In addition, the decreasing trend of AP prevalence in this study is consistent with other studies [7,26,27]. The NHANES surveys (1988–2012) have shown that the age- and sex-standardized AP prevalence has decreased by nearly half [7,26]. The WHO Global Burden of Disease study also showed a decline in AP prevalence from 1990 to 2010 [27].

The decline in age-adjusted prevalence in this study may be related to the institution of national health insurance. A NHANES study found that AP prevalence in people with health insurance decreased from 7.6% in the period 2001–2002 to 5.2% in the period 2011–2012, whereas AP prevalence in those without health insurance increased from 4.7 to 7.6% [26]. Launched in 1995, Taiwan's national health insurance covers 99.6% of the population [28]. The national health insurance policy provides an affordable and accessible medical care, and populations were willing to actively seek health care [29]. Therefore, the risk factors for AP may have gotten more attention and been better controlled [29]. Moreover, our study also revealed an increased percentage of patients with hypertension regularly used medication in 2005–2008 (20.2%), compared to 1993–1996 (9%).

4.2. AP prevalence according to sex and age

Significant gender differences in AP prevalence were found in this study. The AP prevalence in women was between 1.3 and 1.9 times that of men, which is similar to the results of previous studies. A meta-analysis [3] including studies from 59 countries [30] showed that women had higher risk of definite AP than men. Even for confirmed AP women have a higher prevalence than men [23]. Women's higher risk for AP may be caused by biological factors (estrogen) [31], psychological factors (stress) and socio-cultural factors [32].

Previous studies have shown that AP prevalence usually increases with age. Women and elderly people may appear to have lower incidence rates due to atypical symptoms. Reports from the AHA [25], England [33,34] and South Australia [35] have suggested that AP prevalence increases with age, regardless of sex. The pattern of AP prevalence increasing with age in this study supported the results from the other studies.

4.3. Limitations

This is the first study to analyze AP prevalence using Taiwan's national survey data. The secondary analysis was limited by the reliability and validity of the original data, and does not consider the duration of AP occurrence as a factor for determining AP. With regard to patient histories of self-reported physician-diagnosed heart disease or the regular use of heart disease medications, it was not possible to confirm the type of heart disease and involvement of NTG medication, and this may have affected the prevalence of confirmed AP. Although random sampling was used in the surveys, the participation rate was approximately 70%. Selection bias could not be completely ruled out. Self-reported AP symptoms may be influenced through memory, education level, knowledge, symptoms, and the expressiveness of individuals. Although we have adjusted for the effect of age, we cannot completely exclude the impact of differences in the basic attributes of the two survey populations when comparing the prevalence. Further studies are needed to explore more deeply the factors that influence AP prevalence rate in the future. The literature shows patients with angina have lower quality of life, decreased ability to work, and increased medical and social costs [3]. We found that AP prevalence rate has declined but could not confirm the relationship between AP and quality of life or health status. As such, we suggest further research in the future.

5. Conclusions

The overall definite age-adjusted AP prevalence in Taiwan in 2005–2008 was 3.5%. The AP prevalence declined significantly by one-third from 1993 to 1996 to 2005–2008. The prevalence in women was 1.5 times that in men. The prevalence increased with age in men but not in women. Continuous attention should be paid to AP prevalence to better understand the disease burden. Further studies of AP-related factors are likely to help in a better understanding of the reasons for changes in AP prevalence and how to prevent AP.

Contributions

Study design: CCT, SYC, ICH, CJ.
Data collection and analysis: CCT, SYC, ICH, CJ.
Manuscript preparation: CCT, SYC, ICH, CJ, LHU, PHC.

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Conflict of interest

None.

Appendix A. Participant attributes of two surveys

Appendix Table 1
Participant attributes of the 1993–1996 and 2005–2008 NAHSIT surveys.

	1993–1996 (n = 5031)		2005–2008 (n = 4686)		X^2/t	p
	n	% (M ± SD)	n	% (M ± SD)		
Menopausal status					0.4	515
Not menopausal	1202	49.2	972	48.3		
Menopausal	1239	50.8	1042	51.7		
Currently employed					113.6	<0.001
No	2139	42.6	2485	53.5		
Yes	2878	57.4	2162	46.5		
History of smoking					19.1	<0.001
Never	2668	58.4	2709	62.9		
Previous history or currently	1903	41.6	1598	37.1		
Alcohol consumption					113.1	<0.001
Never	1932	42.3	2306	53.6		
Occasionally or often	2637	57.7	1999	46.4		
Disease history						
Respiratory duct	430	8.6	340	7.3	5.6	0.019
Digestive tract	1048	20.8	927	19.8	0.1	0.756
Thyroid	161	3.2	163	3.5	0.6	0.445
Gout	221	4.4	390	8.3	63.6	<0.001
Hypertension	748	14.9	1065	22.7	98.8	<0.001
Stroke	87	1.7	126	2.7	10.4	0.001
Diabetes	261	5.2	407	8.7	46.4	<0.001
Heart disease	360	7.2	338	7.2	0.0	0.913
Medical history						
Hypertension medication	440	9.0	948	20.2	244.2	<0.001
Heart disease medication	188	3.8	288	6.2	27.0	<0.001
Thyroid medication	24	0.5	29	0.6	0.7	0.396
Hypolipidemic medication	68	1.4	167	3.6	47.3	<0.001
Analgesics	275	5.5	280	6.0	1.2	0.280
Asthma or emphysema	44	0.9	68	1.5	6.3	0.012
Diabetes medication	195	4.0	371	7.9	66.6	<0.001
Gastrointestinal medication	326	6.7	276	5.9	2.4	0.122
Measurements and tests[a]						
Body mass index (kg/m^2)	3079	23.92 ± 3.78	2666	24.52 ± 4.01	−5.8	<0.001
Waist circumference (cm)	3094	78.81 ± 10.27	2752	83.31 ± 10.93	−16.2	<0.001
Waist hip circumference ratio	3093	0.83 ± 0.08	2751	0.89 ± 0.08	−24.9	<0.001
Systolic pressure (mm Hg)	4892	127.58 ± 20.89	2744	119.96 ± 19.32	16.1	<0.001
Diastolic pressure (mm Hg)	4890	79.87 ± 13.25	2744	71.67 ± 11.63	28.1	<0.001
Fasting blood glucose level(mg/dl)	2934	90.08 ± 27.89	2684	111.41 ± 37.06	−24.2	<0.001
High-density lipoprotein cholesterol (mg/dl)	2915	56.78 ± 19.83	2694	53.41 ± 15.2	7.2	<0.001
Triglyceride (mg/dl)	2939	135.66 ± 135.45	2694	132.42 ± 101.67	1.0	0.307
Total cholesterol (mg/dl)	2939	196.48 ± 41.82	2695	193.1 ± 38.67	3.2	0.002
Low-density lipoprotein-cholesterol (mg/dl)	2910	112.73 ± 41.45	2694	122.03 ± 35.92	−9.0	<0.001
Hemoglobulin (g/dl)	2932	13.87 ± 1.87	2685	13.61 ± 1.62	5.6	<0.001
Uric acid (mg/dl)	2939	6.21 ± 1.82	2694	6.04 ± 1.74	3.6	<0.001
Metabolism						
Abdominal obesity	843	27.3	1177	42.8	155.2	<0.001
Hypertension	2453	48.8	1427	30.5	338.9	<0.001
Hyperglycemia	482	9.6	1676	35.8	962.9	<0.001
Low high-density lipoprotein-cholesterol	845	29.0	748	27.8	1.0	0.310
High triglyceride	722	24.6	756	28.1	8.9	0.003
Metabolic syndrome	634	12.6	959	20.5	109.5	<0.001

M: mean; SD: standard deviation.
[a] Independent-t test.

Appendix Table 2
Crude (C) and weighted (W) AP prevalence in 1993–1996 and 2005–2008 according to age and sex.

	1993–1996						2005–2008					
	19–44.9		45–64.9		≥65		19–44.9		45–64.9		≥65	
	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)
Possible												
Male	40/1013	4.0 (3.2)	82/978	8.4 (6.0)	53/505	10.5 (10.6)	20/786	2.5 (2.7)	27/772	3.5 (3.4)	36/775	4.7 (4.6)
Female	88/1039	8.5 (6.7)	133/989	13.5 (10.9)	82/507	16.2 (13.0)	58/786	7.4 (6.2)	43/786	5.5 (5.1)	37/781	4.7 (4.3)
All	128/2052	6.2 (4.9)	215/1967	10.9 (8.4)	135/1012	13.3 (11.7)	78/1572	5 (4.4)	70/1558	4.5 (4.3)	73/1556	4.7 (4.4)

(continued on next page)

Appendix Table 2 (*continued*)

	1993–1996						2005–2008					
	19–44.9		45–64.9		≥65		19–44.9		45–64.9		≥65	
	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)	n/total	C% (W%)
p		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001
Definite												
Male	25/1013	2.5 (2.0)	46/978	4.7 (3.4)	31/505	6.1 (6.3)	14/786	1.8 (1.5)	22/772	2.9 (2.8)	26/775	3.6 (3.2)
Female	50/1039	4.8 (3.8)	87/989	8.8 (6.6)	51/507	10.1 (8.8)	41/786	5.2 (4.5)	31/786	3.9 (3.7)	27/781	3.5 (3.1)
All	75/2052	3.7 (2.9)	133/1967	6.8 (5.0)	82/1012	8.1 (7.5)	55/1572	3.5 (2.9)	53/1558	3.4 (3.2)	53/1556	3.4 (3.15)
p		<0.001		<0.001		<0.001		<0.001		<0.001		0.341
Confirmed												
Male	4/1013	0.4 (0.4)	17/978	1.7 (1.5)	17/505	3.4 (2.9)	1/786	0.1 (0.0)	6/772	0.8 (1.2)	13/775	1.7 (1.5)
Female	6/1039	0.6 (0.4)	41/989	4.2 (2.4)	32/507	6.3 (4.8)	3/786	0.4 (0.6)	8/786	1.0 (0.2)	16/781	2.05 (1.8)
All	10/2052	0.5 (0.4)	58/1967	3 (1.9)	49/1012	4.8 (3.8)	4/1572	0.3 (0.3)	14/1558	0.9 (0.7)	29/1556	1.9 (1.7)
p		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001

C: crude percentage; W: weighted percentage; AP, angina pectoris.

Appendix Table 3
Comparison of age-adjusted AP prevalence in 1993–1996 and 2005–2008 according to age and sex.

	1993–1996				2005–2008				2005 vs. 1993		
	19–44.9[b]	45–64.9[c]	≥65[d]	Comparison*	19–44.9[b]	45–64.9[c]	≥65[d]	Comparison*	19–44.9	45–64.9	≥65
	% (95% CI)	% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)	% (95% CI)		*p*	*p*	*p*
Possible											
Male	4 (2.9–5.1)	8.5 (6.7–10.4)	10.7 (8.1–13.4)	3,2 > 1	2.6 (1.6–3.5)	3.3 (2.3–4.3)	4.7 (3.5–5.9)	3 > 1	0.051	<0.001	<0.001
Female	8.5 (7–10.1)	13.3 (11–15.5)	16.3 (13.1–19.5)	3,2 > 1	7.5 (5.9–9.1)	5.5 (4.2–6.8)	4.6 (3.4–5.7)	1 > 3	0.374	<0.001	<0.001
All	6.3 (5.3–7.2)	10.9 (9.4–12.3)	13.5 (11.4–15.5)	3,2 > 1	5 (4.1–6)	4.4 (3.6–5.2)	4.6 (3.8–5.4)		0.068	<0.001	<0.001
p	<0.001	0.001	0.009		<0.001	0.010	0.889				
Definite											
Male	2.5 (1.6–3.4)	4.8 (3.4–6.2)	6.3 (4.2–8.3)	3,2 > 1	1.8 (1–2.6)	2.8 (1.8–3.7)	3.4 (2.4–4.4)	3 > 1	0.253	0.012	0.007
Female	4.9 (3.7–6)	8.6 (6.8–10.5)	10.1 (7.5–12.7)	3,2 > 1	5.4 (4–6.8)	4.0 (2.9–5.1)	3.4 (2.4–4.4)		0.546	<0.001	<0.001
All	3.7 (3–4.4)	6.7 (5.5–7.9)	8.2 (6.5–9.8)	3,2 > 1	3.6 (2.8–4.4)	3.4 (2.7–4.1)	3.4 (2.7–4.1)		0.826	<0.001	<0.001
p	0.002	0.001	0.024		<0.001	0.105	0.955				
Confirmed											
Male	0.4 (0.1–0.8)	1.8 (0.9–2.7)	3.4 (1.9–5)	3,2 > 1	0.2 (0–0.4)	0.8 (0.3–1.3)	1.8 (1.1–2.5)	3 > 1	0.463[a]	0.030	0.031
Female	0.6 (0.2–1)	4 (2.7–5.3)	6.1 (4–8.2)	3,2 > 1	0.4 (0–0.8)	0.9 (0.4–1.5)	2.1 (1.3–2.9)	3 > 1	0.781	<0.001	<0.001
All	0.5 (0.2–0.8)	2.9 (2.1–3.7)	4.7 (3.5–6)	3 > 2 > 1	0.3 (0.1–0.5)	0.9 (0.5–1.2)	1.9 (1.4–2.5)	3 > 2 > 1	0.213	<0.001	<0.001
p	0.525	0.006	0.045		0.230	0.677	0.585				

AP, Angina Pectoris; CI, Confidence Interval.
* After Bonferroni adjustment, the significance level is $p < 0.017$.
[a] Fisher's Exact Test.
[b] Group 1, age 19–44.9 years.
[c] Group 2, age 45–64.9 years.
[d] Group 3, age >65 years.

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