**Research Article**

**Suboptimal Attainment of Cardiovascular Disease Prevention Guideline Goals in Korean Women**

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**S U M M A R Y**

**Purpose:** The purposes of this study were to estimate the distribution of three levels of risk for developing coronary heart disease (CHD; low, moderate, and high risk) and to evaluate the attainment of cardiovascular disease prevention guideline goals by the American Heart Association in a nationally representative sample of Korean women.

**Methods:** This is a secondary data analysis study using the data set from the 2008 Korea National Health and Nutrition Examination Survey IV. The sample was 3,301 Korean women (representing 15,600,514 women) older than 20 years without cardiovascular disease. Distribution of CHD risk and level of goal attainment were calculated using sampling weights and presented in percentages.

**Results:** Among Korean women without established cardiovascular disease, 7.9% were at high risk for CHD, 20.5% were at moderate risk, and 71.6% were at low risk. The proportion of Korean women who did not meet their goals was substantial, and most women at high risk remained unmanaged for their high blood lipids.

**Conclusion:** Korean women at risk for developing CHD need to be managed as soon as possible to attain the guideline goals and to lower their risk for future CHD. Aggressive risk reduction efforts are urgently needed to reduce the public burden of CHD in Korean women.

**Introduction**

Over the past two decades, mortality from coronary heart disease (CHD) has increased about tenfold in Korean women (Korea National Statistical Office, 2010). Furthermore, it is estimated that such epidemics will continue due to prolonged life expectancy and unhealthy changes in lifestyles (H. M. Kim, Kim, Jung, Park, & Park, 2007; Lee et al., 2007). Notably, CHD has become a significant burden in Korean women. As such, primary prevention efforts are crucial in this population.

CHD is relatively difficult to evaluate in women, thus requiring special attention for primary prevention. Evidence regarding gender differences in CHD has shown that women differ from men in their symptom manifestation, pathophysiology, and prognosis of CHD (Bellasi, Raggi, Bairey Merz, & Shaw, 2007; Lee et al., 2008; Quyyumi, 2006; Reis et al., 2001). Unlike men, women frequently do not complain of typical symptoms of CHD (Lee et al.). The onset of CHD in women is about 10–15 years later than in men (Lee et al.). Because of their atypical symptoms and later onset of the disease, the diagnosis of CHD in women can be more difficult. Furthermore, in women cholesterol plaques spread thinly through the artery wall rather than forming major blockages (Reis et al.). In this condition, which is termed coronary microvascular syndrome, plaques accumulate in the tiny cardiac arteries thus limiting blood flow to the heart. It can cause myocardial ischemia, but the plaque is often not visible with diagnostic coronary angiography (Quyyumi; Reis et al.). As a result, CHD in women often goes unrecognized and unmanaged. However, once clinical CHD has developed, women have a worse prognosis than men (Bellasi et al.; Lee et al.); more women die from a first heart attack (Lee et al.). Therefore, aggressive primary prevention of CHD is crucial especially in women.

Fortunately, primary prevention of CHD in women is effective (Brugts et al., 2009; Maruthur, Wang, & Appel, 2009; Stampfer, Hu, Manson, Rimm, & Willett, 2000). Risk reduction through improved control of risk factors and therapeutic lifestyle changes is a central strategy for preventing CHD. Nurses play an important role in primary care such as assessing risk factors and CHD risk as well as providing behavioral interventions and education. Thus, nurses...
must be educated in the use of guidelines and be skilled in CHD risk assessment and risk reduction in women. American Heart Association (AHA) evidence-based clinical guidelines are available to assist in accurate assessment of CHD risk and to provide appropriate therapeutic goals based on risk (Pearson et al., 2002). Adherence to empirically validated clinical guidelines may make it possible to achieve the highest possible levels of CHD risk reduction.

The purposes of this study were to estimate the distribution of three levels of risk for developing CHD (low, moderate, and high risk) and to evaluate the level of guideline goal attainment recommended by the AHA in a nationally representative sample of Korean women who are free of cardiovascular disease (CVD) in order to determine the proportion of Korean women who are in need of preventive care.

Methods

Design and data source

This is a secondary data analysis using data from the 2008 Korea National Health and Nutrition Examination Survey IV (KNHANES IV) collected by the Korea Centers for Disease Control and Prevention (KCDC). The KNHANES, an ongoing program of the KCDC, is a series of independent, nationally representative surveys that have been conducted periodically since 1998. The present study used the data set from the 2008 KNHANES IV because not only was it the latest data set available, but also, each individual within the selected households in the 2008 survey was interviewed separately rather than by obtaining a proxy interview with the household reference person. In addition, to encourage and facilitate participation, compensation (snacks and KRW 10,000) was given to each participant, and a mobile center which traveled to locations throughout the country was introduced as a new feature in 2008 so the response rate was improved in 2008 (74.3%; KCDC, 2008).

Sample

The KNHANES IV collected data from a representative sample of Koreans using a stratified, multistage probability sampling design based on the 2005 census data (KCDC, 2008). The urban and rural areas of 29 administrative districts were first taken as strata. From the strata, 200 national districts were taken as primary sampling units based on proportional random sampling. Lastly, 20–23 households were sampled from each unit, and all family members older than 1 year old in the selected households took part in the KNHANES IV. The sample for this study was limited to women who completed the survey, did not have established CVD, and were older than 20 years. Age at 20 years was chosen because the AHA recommends that CHD risk assessment and risk reduction in women begin at age 20 years. To define established CVD, self-reported heart attack, angina pectoris, or stroke were used. Women who were pregnant or breast-feeding were excluded because pregnancy or breast-feeding may affect body mass index (BMI), blood pressure (BP) or blood sugar. To determine if a woman was pregnant or breast-feeding, self-reported pregnancy or breast-feeding was used.

Of the total of 5,374 women participants in the KNHANES IV, 4,100 women were older than 20 years. After applying inclusion/exclusion criteria, 3488 women were eligible for this study. Among these women, 110 women did not fast for at least 8 hours prior to blood tests or did not answer the question about number of fasting hours, making glucose and lipid levels unreliable. Mean substitutions for glucose and lipid levels for those 110 women were considered, but substituting means for glucose and lipid levels did not change the final results significantly. Also, because those 110 women did not differ in demographics and other cardiovascular risk factors from those who fasted for more than 8 hours, they were excluded from the analysis of this study. Twenty-six women had one or more items missing on physical activities questions. Those with missing data did not differ from those without missing data in terms of demographics and cardiovascular risk factors, so the 26 women were also excluded from the analysis. In the original study, the lipid profile did not include low-density lipoprotein cholesterol (LDL-C) directly, so in this study LDL-C was estimated by the Friedewald equation (LDL = total cholesterol — high-density lipoprotein [HDL] — triglycerides/5). The equation is unreliable and invalid for those with triglycerides at 400 mg/dl or greater (Friedewald, Levy, & Fredrickson, 1972). Fifty-one women had triglyceride levels at 400 mg/dl or greater. Therefore, these women were excluded, yielding a final sample of 3,301 women for the analysis of this study.

Measurements

Demographics

Demographics such as marital status, educational level, work status, and monthly household income were included in this study to describe sample characteristics. In particular, there is no official poverty line in Korea so the concept of poverty income ratios was used to define poverty level for this study. The poverty income ratios represents the ratio of family income adjusted by family size to the poverty threshold, which is based on the minimum cost of living set by the Ministry of Health and Welfare (KRW 1,400,000 for a household of 4 people per month; approximately USD 1,300 per month). Ratios below 1 indicate that the income for the respective family is below the poverty threshold, and were therefore considered as being below the poverty level.

CHD risk assessment

According to the AHA guidelines, CHD risk assessment is based on the number of cardiovascular risk factors and a 10-year risk using the Framingham Risk Score (FRS; Figure 1). Diabetes is considered to be a CHD equivalent for risk classification purposes. In this study, diabetes was defined as a self-reported previous history of diabetes, use of glucose lowering medications, or a fasting blood glucose ≥ 126 mg/dl (American Diabetes Association, 2010). Those with diabetes were considered at already high risk for CHD.

Age was measured in years; an age of 55 years or greater was considered a risk factor for CHD. Participants were considered current smokers if they reported that they were currently smoking. BPs were obtained three times, and the average of the second and third BPs was used for this study as recommended by the Joint National Committee 7 (Chobanian et al., 2003). Participants were also asked whether they were currently on antihypertensive medications. Hypertension was defined as a systolic or diastolic BP > 140/90 mmHg or the use of antihypertensive medications (Chobanian et al.). Blood samples were collected after 8 hours of fasting, and blood glucose and lipid levels were analyzed in a national laboratory. An HDL-C level of less than 50 mg/dl is considered low and was counted as a risk factor for CHD; if HDL-C is greater than 60 mg/dl, 1 was subtracted from the risk factor count. It should be noted that family history was not available in the original data set. Thus, only four risk factors excluding family history were used in the risk factor count to assess CHD risk in this study. For those with two or more risk factors, the FRS was calculated using the downloadable spreadsheet calculator (National Heart Lung Blood Institute, 2010). It estimates an individual’s risk of having a first heart attack in the...
next 10 years using seven variables: age, sex, total cholesterol, HDL-C, smoking status, systolic BP and the subjects’ use of medication to control hypertension.

Goal attainment
In this study, goal attainment was based on the AHA guideline goals for CVD prevention in women. According to the AHA guidelines, the goal for LDL-C levels is determined based on the CHD risk assessed (Figure 1). LDL-C was not directly measured in the original study, so it was estimated with the Friedewald equation. BMI was calculated from the formula of weight in kilograms divided by height in meters squared (kg/m²). Overweight/obesity was defined as BMI at 23 kg/m² or greater in this study on the basis of the Asian-Pacific region of the World Health Organization (2000). Waist circumference was measured in centimeters, and abdominal obesity was defined as a waist circumference of 85 cm or greater as suggested by the Korean Society for the Study of Obesity (Lee et al., 2007).

Physical activity was self-reported with the Korean version of the International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003). Subjects were asked to recall the frequency, duration, and intensity of physical activity engaged in for at least 10 minutes in the past 7 days. Data collected with the IPAQ were scored in metabolic equivalent-minutes/week (1 MET = 3.5 mL of oxygen uptake per kg per minute) for this study (IPAQ, 2003). Engaging in at least 30 minutes of moderate activity on most or preferably all days of the week can help to prevent CHD. This amount of physical activity is approximately 600 MET-minutes/week (IPAQ). Women with less than 600 MET-minutes/week were considered sedentary in this study. The IPAQ, when developed, showed acceptable reliability (Spearman’s rho = .67) and criterion validity (compared to the accelerometer) for 20 diverse countries, comparable to most other self-report physical activity questionnaires (Craig et al.). The reliability and validity of the Korean version of IPAQ showed similar results (Oh, Yang, Kim, & Kang, 2007).

Statistical analysis
The SPSS Complex Samples 19.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis of this descriptive study. All study variables were screened for missing data, outliers, and suspected errors. To account for the study’s multistage stratified sampling design and to estimate population-based results, sampling weights were applied for the analysis of this study so the estimates were representative of Korean women. Weighted means and percentages were presented to describe demographic characteristics.

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Figure 1. American Heart Association evidence-based guidelines for CVD prevention in women. Adapted from “AHA guidelines for primary prevention of cardiovascular disease and stroke,” by Pearson et al., 2002, Circulation, 106, p. 388-391. CVD = cardiovascular disease; RF = risk factor; BP = blood pressure; FRS = Framingham Risk Score; HDL-C = high density lipoprotein cholesterol; LDL-C = low density lipoprotein cholesterol.
cardiovascular risk factors, and the proportion of women who did not attain CVD prevention guideline goals.

Ethical aspects

The original survey was approved by the KCDC institutional review board. This study used only de-identified existing data with no subject contact. Permission to conduct this study was approved by the University of California San Francisco Committee on Human Research. The SPSS data set and the data directory were directly downloaded from the KCDC website (http://knhanes.cdc.go.kr/), and downloaded electronic data were protected with a password.

Results

Demographic characteristics and cardiovascular risk factors of Korean women are presented in Table 1. The sample of this study represents 15,600,514 Korean women older than 20 years with a weighted mean age of 47.7 years. Table 2 shows the distribution of three risk categories among Korean women, based on the AHA guidelines for CVD prevention. About 8% of the Korean women were categorized as high risk for future cardiac events, 20.5% were moderate risk, and 71.6% were low risk. An evaluation of the risk for developing CHD by age groups was graphically depicted in Figure 2. The proportion of moderate or high risk women increased especially after age 50. More than 80% of Korean women older than 60 years had at least two cardiovascular risk factors for CHD, and less than 20% were at low risk for CHD. In addition, even for Korean women in their 20s, approximately 1 in 100 was categorized as high risk for developing CHD.

The percentages of Korean women who did not attain the CVD prevention guideline goals are presented in Table 3. Overall, 18.3% of Korean women did not meet the primary goal of LDL-C less than 100 mg/dL. More than 70% of high risk women had HDL-C levels lower than the recommended levels; less than half (48.3%) had their blood pressure controlled; only 14.5% had fasting blood sugar levels less than 100 mg/dL; about one in four maintained their weight within normal range; and more than half were centrally obese. For the moderate risk group, the recommended LDL-C goal is less than 130 mg/dL, and 40.3% of women in this risk group were not at the LDL-C goal level.

Discussion

This study evaluated the distribution of CHD risk in Korean women and the attainment of CVD prevention guideline goals by the AHA. Based on the numbers of risk factors and the FRS, 7.9% of Korean women (representing 1,227,246 women) without established CVD were at high risk for CHD: 20.5% (representing 3,196,939 women) were at moderate risk; and 71.6% (representing 11,176,329 women) were at low risk. It should be noted that in this study, family history was not available in the original data set, thus only four risk factors excluding family history were used in the risk factor count. Such data may underestimate the true proportion of Korean women at moderate risk and overestimate the low risk group but not affect the high risk group.

Evidence has shown that risk reduction significantly reduces mortality from CHD in asymptomatic women (Brugts et al., 2009; Cannon et al., 2004). Although the benefits of risk reduction are well identified, Korean women showed a lack of goal attainment. Overall, 18.3% of Korean women free of CVD were not at LDL-C goal levels and were therefore in need of treatment to prevent future cardiac events. Although the benefits of risk reduction are greatest in those at high risk, unfortunately goal attainment was the worst in Korean women at high risk. Three in four high risk women did not attain the primary goal of LDL-C. Lack of goal attainment was most prevalent in the high risk group. About three in four women in the high risk group did not meet the primary goal of LDL-C less than 100 mg/dL. More than 70% of high risk women had HDL-C levels lower than the recommended levels; less than half (48.3%) had their blood pressure controlled; only 14.5% had fasting blood sugar levels less than 100 mg/dL; about one in four maintained their weight within normal range; and more than half were centrally obese. For the moderate risk group, the recommended LDL-C goal is less than 130 mg/dL, and 40.3% of women in this risk group were not at the LDL-C goal level.

Table 2 Distribution of Coronary Heart Disease Risk in Korean Women

<table>
<thead>
<tr>
<th>Risk groups</th>
<th>n</th>
<th>Weighted n</th>
<th>% (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk</td>
<td>2,123</td>
<td>11,176,329</td>
<td>71.6 (0.9)</td>
</tr>
<tr>
<td>Moderate risk</td>
<td>867</td>
<td>3,196,939</td>
<td>20.5 (0.9)</td>
</tr>
<tr>
<td>High risk</td>
<td>311</td>
<td>1,227,246</td>
<td>7.9 (0.5)</td>
</tr>
<tr>
<td>Total</td>
<td>3,301</td>
<td>15,600,514</td>
<td>100.0 (0.0)</td>
</tr>
</tbody>
</table>

Notes. SE = standard error; FRS = Framingham Risk Score.

- Low risk refers to one or less risk factor among hypertension, high-density lipoprotein level < 50 mg/dL, age ≥ 55 years, and cigarette smoking.
- Moderate risk refers to two or more risk factors listed and FRS < 20%.
- High risk refers to two or more risk factors listed and FRS ≥ 20% or diabetes.

Table 1 Demographic Characteristics and Cardiovascular Risk Factors in Korean Women (n = 3,301, Weighted n = 15,600,514)

<table>
<thead>
<tr>
<th>Demographics or cardiovascular risk factors</th>
<th>M or % (SE)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>47.7 (0.4)</td>
<td>20.0-93.0</td>
</tr>
<tr>
<td>Marital status (married &amp; living together)</td>
<td>67.3 (1.1)</td>
<td>-</td>
</tr>
<tr>
<td>Education (high school or less)</td>
<td>75.5 (1.1)</td>
<td>-</td>
</tr>
<tr>
<td>Employed (n = 3,296)</td>
<td>47.0 (1.1)</td>
<td>-</td>
</tr>
<tr>
<td>Below poverty level (n = 3,208)a</td>
<td>23.7 (1.0)</td>
<td>-</td>
</tr>
<tr>
<td>Blood lipids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosed dyslipidemia</td>
<td>6.1 (0.5)</td>
<td>-</td>
</tr>
<tr>
<td>Lipid-lowering treatment</td>
<td>2.8 (0.3)</td>
<td>-</td>
</tr>
<tr>
<td>Total cholesterol (mg/dL)</td>
<td>186.2 (0.8)</td>
<td>95.0-449.0</td>
</tr>
<tr>
<td>LDL-C (mg/dL)</td>
<td>113.9 (0.7)</td>
<td>17.8-316.0</td>
</tr>
<tr>
<td>HDL-C (mg/dL)</td>
<td>51.0 (0.3)</td>
<td>22.8-106.2</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>106.4 (1.4)</td>
<td>18.0-398.0</td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosed hypertension</td>
<td>15.8 (0.7)</td>
<td>-</td>
</tr>
<tr>
<td>Hypertension treatment</td>
<td>14.1 (0.7)</td>
<td>-</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>111.8 (0.4)</td>
<td>74.0-224.0</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>72.5 (0.3)</td>
<td>36.0-153.0</td>
</tr>
<tr>
<td>Blood glucose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosed diabetes</td>
<td>5.9 (0.4)</td>
<td>-</td>
</tr>
<tr>
<td>Diabetes treatment</td>
<td>4.6 (0.4)</td>
<td>-</td>
</tr>
<tr>
<td>Fasting blood sugar (mg/dL)</td>
<td>96.1 (0.5)</td>
<td>43.0-398.0</td>
</tr>
<tr>
<td>Current smoking</td>
<td>7.3 (0.6)</td>
<td>-</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>23.1 (0.1)</td>
<td>15.3-40.5</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>78.1 (0.3)</td>
<td>46.2-127.0</td>
</tr>
<tr>
<td>Physical inactivityb</td>
<td>33.5 (1.2)</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes. SE = standard error; LDL-C = low-density lipoprotein cholesterol; HDL-C = high-density lipoprotein cholesterol; BP = blood pressure; MET = metabolic equivalent.

- a Below poverty level refers to a poverty-income ratio of less than 1.
- b Physical inactivity refers to MET-minutes/week < 600.

Figure 2. Distribution of risk for coronary heart disease among Korean women aged 20 years or older by age group (n = 3,301).
not meet the primary goal of LDL-C less than 100 mg/dL and were in need of aggressive and urgent lipid-lowering treatment; 70.6% had HDL-C less than 50 mg/dL; more than half had blood pressure levels higher than the recommended levels; 85.5% had blood sugar at 100 mg/dL or greater; and 4.0% were current smokers. This is a serious problem because their risk for future cardiac events is as high as those with established CVD. Korean women at high risk need to be managed as soon as possible to attain the guideline goals and to lower their risk for future CHD accordingly.

LDL-C, the primary target for CHD risk reduction, can be managed effectively through the use of lipid-lowering medications and therapeutic lifestyle changes such as quitting smoking, increasing physical activity, and maintaining a healthy diet for all risk categories. However, for those at high risk, lifestyle changes alone are often insufficient to attain the LDL-C goal (Grundy et al., 2004). Current guidelines recommend starting lipid-lowering medications for those at high risk when asymptomatic individuals do not meet the LDL-C goal of less than 100 mg/dL (Grundy et al.). Previous studies found that use of lipid-lowering medications is the strongest predictor for the LDL-C goal attainment (Fuke et al., 2004; Mosca et al., 2005). It is safe and beneficial in reducing cardiovascular mortality (Brugts et al., 2009; Cannon et al., 2004). However, this study found a significant treatment gap in Korean women. Even though treatment rates increased with increased cardiovascular risk, there was still substantial room for improvement in lipid-lowering treatment among women at high risk. In this study, only 10.6% of women in the high risk group were on treatment to lower their blood lipids, and most Korean women at high risk remained untreated. This is a significant treatment gap, given that 74.6% of high risk women were actually in need of lipid-lowering treatment. Korean women are exposed to high risk for future CHD even though there are relatively safe and effective intervention strategies available as well as compelling evidence showing reduction in CHD mortality with lipid-lowering treatment.

Furthermore, evidence suggests that for the high risk group, an LDL-C level of less than 100 mg/dL is not an optimal goal but a minimal goal to be attained (Cannon et al., 2004; Grundy et al., 2004; Heart Protection Study Collaborative Group, 2002). Clinical trials have shown that an LDL-C level lower than 100 mg/dL with lipid-lowering medications further reduces relative risk for CHD (Cannon et al.; Heart Protection Study Collaborative Group). The trials also showed that reducing LDL-C to 70 mg/dL in the high risk group would produce another 16–30% of risk reduction compared to LDL-C at 100 mg/dL. For the high risk group, an LDL-C level of 100 mg/dL should be viewed as a minimal goal to be attained. For maximum benefit, an LDL-C level of less than 70 mg/dL is recommended. In this study, when applying the cut-points of LDL-C less than 70 mg/dL or greater, only 3.9% of women in the high risk group attained this level. This suggests that lipid-lowering treatment is not optimal for Korean women free of CVD, and there is substantial opportunity to improve lipid management.

Suboptimal lipid-lowering treatment in Korean women may be related to several factors. This study found that LDL-C goal attainment was the worst in women at high risk even though the proportion of women taking lipid-lowering medications was the highest in this group, and on average, LDL-C in the high risk group is lower than that of women at moderate risk. One possible explanation for this finding is that the intensity of risk reduction is always risk-based, so those at higher risk need more aggressive therapy. Because of the central role of LDL-C in the development of CHD, the LDL-C goal for the high risk group is more stringent than other risk groups. Therefore, those at high risk require more aggressive lipid management efforts to effectively reduce their increased risk. Another possibility that may explain the treatment gap is that Korean women lack knowledge about blood lipids and their role in the development of CHD. A study showed that the majority of middle-aged Korean women failed to recognize lipids as risk factors for CHD, and about 95% of women did not know their blood lipid levels (Choi et al., 2010). Lack of awareness of blood lipids may impede risk reduction efforts to lower lipids, leading to suboptimal lipid-lowering treatment and lack of LDL-C goal attainment.

Although LDL-C is the primary target for CHD prevention, therapeutic lifestyle changes are the first recommended strategy by AHA for preventing CHD in all asymptomatic individuals. Unhealthy lifestyles, if they persist for a long time, convey substantial risk for CHD. However, the findings of this study imply that the proportion of Korean women engaged in healthy lifestyles is very small. About 7.3% of women were current smokers; one in three women was sedentary; about half of Korean women were overweight; and 24.4% were centrally obese. In addition, 49.2% of Korean women had low HDL-C levels, which are suggested to be related to excess carbohydrate intake and a sedentary lifestyle (M. H. Kim, Lee, Park, & Kim, 2007; W. Y. Kim, Kim, Choi, & Huh, 2008). Facilitating an effective intervention to motivate women to be active, maintain their weight, and eat a heart-healthy diet may put
a brake on the current epidemic rise of CHD in Korea. It should be a priority in reducing the public burden of CHD.

There are several issues that may have affected the accuracy of the findings of this study. The KNHANES IV used a probability sampling design but the sampling frame excluded institutionalized individuals. The findings from the survey can be interpreted as representative of the community-dwelling population. Self-reported data may be subject to response bias, especially for questions about smoking status. Because of the strong social taboo against women smoking in Korea, participants may have responded in a socially desirable way, so the risk for CHD may be underestimated. However, the strengths of this study are well-established methods and procedures, and large randomly selected representative sample. In addition, estimates were calculated using the sampling weights, so the estimates are representatives of noninstitutionalized Korean women.

Conclusion

The most important finding of this study is that the proportion of Korean women who were not at the AHA guideline goals was substantial. Furthermore, most Korean women at high risk remained unmanaged for their high blood lipids. The findings of this study suggest that, on the basis of the AHA evidence-based guidelines for CVD prevention, Korean women free of CVD need to be managed more aggressively to control their cardiovascular risk factors. Also, facilitating effective interventions that motivate Korean women to adopt healthy lifestyles, including quitting smoking, having regular physical activity, and maintaining a healthy weight, is urgent. Nurses in all settings are well positioned and should be active in advising women to change unhealthy lifestyles.

In addition, suboptimal goal attainment can be related to several factors such as age, comorbid diseases, socioeconomic status, treatment status, or nonadherence to treatment guidelines by physicians or lack of adherence by patients. This study did not attempt to identify the variables related to the lack of goal attainment. Further research is warranted to identify predictors of lack of goal attainment in order to help Korean women effectively reduce their risk for future cardiac events.

Conflict of interest

The authors declare no conflict of interest.

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