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Cardiac Health: Primary Prevention of Heart Disease in Women

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Synopsis

Heart disease is the number one cause of death among women. Although 450,000 women die annually from it, this fact is unknown to many women. Because heart disease is frequently preventable, increasing awareness of personal risk and preventative measures is a key element of healthcare for women. Nurse clinicians can evaluate, educate, and counsel women regarding their risk for this pervasive disease and promote behavior changes that will decrease that risk. Research evidence supports that lifestyle behaviors are the cornerstone of heart disease prevention. This article presents current evidence for the prevention of heart disease related to dietary intake, physical activity, weight management, smoking cessation, blood pressure control, and lipid management. Guidelines for implementing findings in clinical practice are discussed.

Keywords

heart disease; prevention; women; lifestyle; evidence-based; risk factors

Introduction

Today, over 41 million women suffer from cardiovascular disease (coronary heart disease, stroke, and congestive heart failure, etc.) in the United States today with more than 450,000 women dying each year. Coronary heart disease (CHD) is the leading cause of death in women 65 years of age. One out of every six female deaths is associated with CHD.[1] These are startling statistics, but more recently, death rates among men have decreased by 52% and, among women 65 years of age, death rates have decreased by 49%.[2] Current research has helped explain the underlining contributions to these reductions in mortality.

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Evidence-based medical therapies have decreased death rates by 47%, and behavior changes to alter risk factors have reduced death rates by 44%. [3] Therefore, a woman can decrease her CHD risk by targeting lifestyle habits.

The Nurses' Health Study is a large cohort study designed to assess the effects of a combination of lifestyle practices on the risk of coronary heart disease. [4–7] Findings from this longitudinal, observational study demonstrated that a woman was able to decrease the incidence of a coronary event by more than 80% through not smoking, maintaining normal body weight (body mass index or BMI < 25 kg/m²), consuming a healthy diet, participating in moderate to vigorous exercise for 30 minutes a day, and consuming a moderate amount of alcohol. [5,7] Over the 14-year period studied, the incidence of CHD declined by 31% across all age groups. Research has demonstrated that primary prevention can help decrease the incidence of CHD as well as the associated mortality rates. The purpose of this article is to describe the assessment of risk factors associated with CHD, present the current evidence on prevention of CHD, and discuss guidelines for implementing findings in practice.

Assessment of Risk Factors

History

An important first step in assessing a woman's risk for CHD is to collect information on her medical, social/lifestyle, and family history. A thorough evaluation of the medical history including pre-existing medical conditions, such as hypertension, dyslipidemia, and diabetes, is necessary to determine the woman's baseline risk. Patients with diabetes are at a higher risk for CHD and have two times the risk of myocardial infarction (MI) compared to the general population. [8] Elevated blood pressure and abnormal lipids are both strong, independent risk factors for CHD. [9] Assessment of the social and lifestyle history provides information regarding behaviors, such as smoking, alcohol consumption, dietary habits and physical activity. Smoking, obesity, a diet high in fat, and a sedentary lifestyle are all risk factors for heart disease. [10,11] In fact, smoking is associated with a greater risk of MI in women, particularly among women less than 45 years of age. [12] Overweight and obesity are associated with co-morbid conditions such as heart failure and increase one's risk for CHD and sudden death. [13] A longitudinal evaluation of more than 111,000 patients found that severely obese individuals (BMI ≥ 40 kg/m²), which comprised about 6% of the sample, experienced their first MI 12 years sooner than their normal weight counterparts. [14] A sedentary lifestyle is associated with an increase in CHD risk and CVD mortality. [15] Patient information concerning these lifestyle habits is part of the overall assessment of baseline risk. Family history is another critical component that must be considered in determining risk for CVD. A woman who has a first-degree relative with premature CVD, i.e., < 55 years old in a male relative and < 65 years old in a female relative, is considered at risk. [16]

Symptoms

Precordial or retrosternal chest pain or pressure is one of the classic symptoms of a MI. The quality of the pain has been described as heaviness, crushing, aching, burning, or squeezing and has been noted to radiate to the jaw, neck, arms, or back. Other associated symptoms include shortness of breath, nausea/vomiting, diaphoresis, and lightheadedness. Research shows that about 33% of patients present without chest pain, and symptoms in women tend to be more atypical, e.g., the absence of chest pain is more common in women than men. [17] Women also tend to present with more associated symptoms such as middle or upper back pain, neck or jaw pain, shortness of breath, indigestion, and fatigue. [17, 18]

Physical exam

A physical examination for the evaluation of risk should include blood pressure, BMI, and waist circumference (WC) as well as blood work i.e., fasting glucose and lipid profile. A normal systolic blood pressure is less than 120 mm Hg, and a normal diastolic blood pressure is less than 80 mm Hg. BMI is a measure of body fatness and is derived from the patient's weight in kilograms divided by the height in meters squared. A BMI between 18.5 and 24.9 kg/m² is normal weight, 25 to 29.9 kg/m² is overweight, and > 30 kg/m² is considered obese.[13] The goal for the patient is to achieve a normal, healthy body weight. Increased WC, a measure of abdominal adiposity, has been correlated with increased risk of insulin resistance, diabetes, MI and even death.[19, 20] Sex-specific cutoffs have been established to identify relative risk; women with a WC > 35 inches (88 cm) are at high risk for developing morbidities like CVD.[9] To measure WC, palpate the upper hipbone to locate the iliac crest, and draw a horizontal line just above the upper border of the iliac crest. Cross that line with a vertical line from the mid-axillary position. Keeping the measuring tape parallel to the floor, wrap the tape around the abdomen at the level of the marked point, and take the measurement during the patient's exhalation.[21] A blood glucose level should be measured after an 8-hour fast. A normal level is < 100 mg/dL; one is considered pre-diabetic with a blood glucose of 101–125 mg/dL, and diabetes is present if the fasting level is ≥ 126 mg/dL.[22] Desirable fasting lipid profiles for women, drawn after a 12-hour fast, include low-density lipoprotein cholesterol (LDL-C) < 100 mg/dL, high-density lipoprotein cholesterol (HDL-C) > 50 mg/dL, triglycerides < 150 mg/dL, and non-HDL-C (the total cholesterol minus HDL-C) < 130 mg/dL.[16]

Framingham risk assessment

Risk factor assessment provides the chance to identify asymptomatic women who are in danger of developing CHD in the long term. The Framingham Risk Score (FRS) is a tool that may be utilized to assess one's 10-year likelihood of MI or CHD death by assigning a point value to each of five established risk factors— age, total cholesterol, HDL-C, blood pressure, and cigarette smoking.[23] The total score is used to determine low (<10% risk of MI or CHD death), intermediate risk (10–20% risk), or high-risk (>20% risk).[9] Because overall lifetime risk for CVD approaches 1 in every 2 women [24] and this score is focused on 10-year risk, the FRS should be used as part of the total risk assessment that includes medical, lifestyle, and family history.[16]

Evidence for Prevention

Dietary intake

In the prevention of CHD, it is important to consume an overall healthy diet focusing on adequate nutrient intake and energy balance. Evidence-based recommendations from the American Heart Association (AHA) include balancing caloric intake with energy expenditure in order to attain or maintain a normal body weight (BMI < 25 kg/m²), eating a diet containing an abundance of fruits, vegetables, whole-grain and high-fiber foods, fish twice weekly, and moderate alcohol consumption.[11] In particular, fruits and vegetables that are rich in color, e.g., dark green and orange, should be consumed several times a week. Whole grains include items like whole wheat, oats, corn, and brown rice and should comprise a minimum of half an individual's grain intake. Fiber intake should be between 20–30 g/d.[9] Fish is recommended, particularly oily fish, because it is rich in long-chain omega-3 polyunsaturated fatty acids, and is associated with a decreased risk of sudden death and death from CHD.[11] Moderate alcohol intake has been associated with a beneficial effect on cardiovascular health,[25] and therefore, if individuals consume alcohol, no more than one drink per day is recommended for a woman. A large, international case control study found daily consumption of fruits and vegetables, moderate or vigorous intensity

physical activity, and at least thrice weekly alcohol consumption to be protective against acute MI.[26]

Food items that should be restricted in a woman's diet include saturated fat, trans fat, cholesterol, added sugars, and salt.[11] The intake of saturated fat, trans fat, and cholesterol should be limited to < 7% of fat intake, < 1% of fat intake and < 300 mg, respectively. Trans fats are partially hydrogenated fats created by adding hydrogen to liquid vegetable oils making the oils solid for use in bakery items, pre-packaged snacks, and deep-fried foods. [27] In order to achieve these fat intake goals, women should consume lean meats or meat alternatives and dairy products that are fat free or low fat. Total dietary fat intake should not exceed 35% of total daily caloric intake.[9] Among the participants in the Nurses' Health Study, improvement in diet, e.g., a 31% decline in the intake of trans fats, a 90% increase in the intake of cereal fiber, explained a 16% decrease in CHD between the assessment points of 1980–82 and 1990–92, after adjusting for age and smoking.[5] Limiting the intake of foods and beverages with added sugars is advocated in order to support lower caloric intake, energy balance, and adequate nutrient intake. Selecting and cooking foods with little salt can support blood pressure control and a daily limit of 2.3 g/d of sodium is recommended.[11] Because eating outside of the home is associated with larger food portions and food items of higher energy density and salt content, women should choose foods carefully when eating in restaurants and practice portion control.

Physical activity

There has been significant research to support the use of exercise in decreasing the risk of CHD.[28–31] By improving overall fitness and increasing exercise capacity, one can decrease risk that may result in up to a 35% reduction in CHD.[28] Current recommendations to improve health, from the American College of Sports Medicine (ACSM) and the AHA, advise individuals between the ages of 18–65 years to participate in moderate intensity aerobic physical activity for a minimum of 150 minutes per week or vigorous intensity aerobic activity for at least 75 minutes per week.[32] A combination of moderate and vigorous intensity activity will yield the same benefits. Updated recommendations also suggest that individuals will benefit from twice-weekly activities that increase muscle strength (8–10 weight resistance exercises with 8–12 repetitions per exercise).

The Women's Health Initiative Observational Study enrolled 73,743 postmenopausal women to examine total physical activity score, walking, vigorous exercise, and hours spent sitting or sleeping as predictors of cardiovascular events.[29] They found that the total physical activity score at baseline exhibited a strong inverse relationship with CHD. The more activity a woman participated in, the lower her risk for the development of disease. Women who exercised for 2.5 hours per week, by either walking or through vigorous exercise, had decreased their risk for CHD by 30%. This finding is consistent with the guidelines established by the AHA and the ACSM. Risk was decreased further if the women participated in both vigorous activity and walking than either one alone. Cardiovascular risk decreased less in women who spent more time sitting or lying compared to those who moved around more.[29]

Lee and colleagues [30] examined the relationship between physical activity, specifically walking, and the risk of CHD among women. Data indicated that at least one hour of walking per week predicted a lower risk for CHD. This study indicated that even light-to-moderate activity is associated with lower CHD rates in women. Women who participated in 600 to 1499 kcal/week of physical activity had a significant decrease in coronary risk factors. When women in the highest level of physical activity were compared with women in

the lowest category, data showed a lower risk of CHD among the women who were most active.[30]

Bassuk and Manson [31] also discussed the cardioprotective mechanisms associated with exercise. They stated that exercise reduces cardiovascular risk independently of weight regulation. Thirty minutes of moderate-intensity activity has been shown to lower blood pressure, raise glucose tolerance and insulin sensitivity, and improve lipid levels. In summary, all of the findings indicated that both walking and vigorous exercise were associated with a decrease in CHD events. By increasing physical activity to at least 150 minutes per week, a woman can decrease her risk for CHD.

Weight management

Body weight management is critically important for promoting cardiac health because obesity is linked to cardiac arrhythmias, congestive heart failure, ischemic heart disease, and sudden death.[10] obesity was added as an independent risk factor for CHD more than ten years ago.[33] For normal-weight women, weight gain should be avoided by ensuring a balance between energy consumed and energy expended, to prevent the average weight gain of 0.5 to 1 kg accumulated annually by adults in the U.S.[34] Efforts to avoid the positive energy imbalance resulting in weight gain, which includes small reductions in food intake or increases in physical activity, may need to be intensified over a woman's lifetime to adjust for physiologic, age-related changes.[35] For women who are overweight or obese, the recommended initial weight loss goal is 10% of baseline weight [21] because losing and maintaining a moderate 10% weight loss is associated with improvement in insulin resistance, hypertension, dyslipidemia, and inflammation.[10] A weight loss program should include a 500-calorie/day reduction in food intake and a 1,000-calorie/week expenditure in physical activity to obtain a weight loss of 0.5 to 1.0 kg per week.[36]

Behavioral approaches to the treatment of obesity include several common components—goal setting for dietary intake and physical activity, self-monitoring, problem solving, stimulus control, cognitive restructuring, and relapse prevention.[36, 37] Goal setting involves setting daily and weekly targets for calorie and fat intake as well as physical activity, e.g., consuming 1200 to 1500 calories daily, 25% of calories from fat, and engaging in 150 minutes of physical activity each week.[38, 39] Self-monitoring requires keeping a detailed record of food intake and activity in order to increase one's awareness of behaviors that support or hinder weight loss endeavors [36] and has consistently been associated with success in losing weight and maintaining weight loss.[40,41] Problem-solving techniques help individuals recognize barriers to their weight loss efforts, choose potential resolutions to these barriers, apply the solution, and then examine the effectiveness. Using stimulus control, one modifies the environment to support behaviors that promote weight loss or maintenance, e.g., placing fresh fruit or vegetables in visible places, placing high fat foods in the back of the cabinet, placing athletic shoes by the door as a reminder to take a walk. Recognizing and adjusting weight control thoughts is accomplished through cognitive restructuring, like replacing negative or all-or-nothing thoughts with positive and self-affirming thoughts. In relapse prevention training, individuals are taught how to recognize high-risk situations for lapses in their behavior changes, e.g., eating at parties and anticipating the challenges of staying with their eating plan. Individuals must also develop a plan for how they will manage high-risk situations, perhaps even role-playing the situation with the person counseling them.[36]

Pharmacotherapy is an appropriate weight loss tool for certain women and is currently approved for persons with a BMI of ≥ 30 kg/m² or for those with a BMI of ≥ 27 kg/m² who have obesity-related co-morbidities e.g., sleep apnea, diabetes, hypertension. Two medications, sibutramine and orlistat, have been approved by the FDA for up to 2 years of

long-term use and have been found to be beneficial for weight loss maintenance.[42] Sibutramine reduces appetite by blocking the reuptake of serotonin and noradrenaline in the central nervous system; 10mg/d is the recommended initial dose. Sibutramine should be used cautiously in women with hypertension, stroke, and cardiovascular disease due to the potential for increased heart rate and blood pressure.[10] Orlistat decreases fat absorption by approximately 30% at the 120mg TID dose through gastrointestinal tract inhibition of gastric and pancreatic lipases essential for digestion of fats, but has been associated with side effects like oily stools or fecal incontinence and decreased absorption of fat-soluble vitamins, A, D, and E. A half-strength dosage of orlistat is available without a prescription as Alli™. Drug therapy must be utilized in conjunction with lifestyle changes in order to be effective long-term.[10]

Surgical treatment of obesity may be indicated in women with severe obesity (BMI ≥ 40 kg/m²) or a BMI ≥ 35 kg/m² and co-morbidities like sleep apnea, diabetes, or hypertension.[43] Several bariatric surgical approaches are used for weight loss via restrictive and/or malabsorptive methods, e.g., gastric bypass, vertical banded gastroplasty, adjustable gastric banding, and biliopancreatic diversion.[44] A meta-analysis of 22,094 patients that examined the impact of bariatric surgery found that diabetes and hypertension were resolved in 76.8% and 61.7% of patients, respectively; in at least 70% of patients, dyslipidemia improved.[45] After 10 years of follow up, The Swedish Obese Subjects Study reported better recovery rates from diabetes, elevated triglycerides, hypertension, and low levels of HDL-C compared to matched control participants.[46] For the severely obese patient, weight loss induced by bariatric surgery is associated with an improvement in cardiovascular risk profile.

Smoking Cessation

Although there is limited evidence from randomized trials, it is still strongly recommended that women refrain from smoking or exposing themselves to second hand smoke. Smoking cessation has been identified as an important lifestyle intervention in the prevention of CHD.[16, 47] The Nurse's Health Study clearly demonstrated a decrease in coronary events through changes in lifestyle including smoking cessation. As mentioned previously, the risk of CHD declined by 31% across all age groups, and these results were consistent with a decrease in smoking by 41%.[5] Another prospective cohort study completed in Copenhagen, Denmark also found that there was a decrease in risk for myocardial infarction when an individual quit smoking. There was no change in risk for individuals who only decreased the amount of cigarettes smoked per day.[48] Women should be encouraged to quit smoking in order to prevent CHD. There are many avenues available to assist with smoking cessation, including counseling, nicotine replacement and other pharmacotherapies. Many of these therapies in conjunction with a formalized smoking cessation program that provides group counseling can help a woman to quit smoking.

Management of Hypertension and Dyslipidemia

A blood pressure $< 120/80$ mm Hg is optimal for the prevention of CHD and can be accomplished through weight control, increasing physical activity, using alcohol in moderation, restricting sodium intake, and increasing the intake of fruits, vegetables, and low-fat dairy products.[16, 47] If blood pressure is $\geq 140/90$ mm Hg, then pharmacotherapy is indicated. Thiazide diuretics are used for most patients unless contraindicated. If a woman is considered to be at high-risk then beta blockers and/or the addition of an ace-inhibitor along with a thiazide agent is recommended.[16]

Drug therapy along with lifestyle interventions, such as increasing physical activity, should be used in women with CHD to keep LDL-C < 100 mg/dl.[16, 47] Aerobic exercise will

increase HDL-C levels thus decreasing risk.[49, 50] If increasing physical activity and reducing body weight still does not decrease cholesterol levels, statins are very effective in lowering LDL levels. Research has shown that statins can decrease the five-year incidence of major coronary events.[51] Based on the above evidence, it is important for health care professionals to encourage women to make changes to control BP and manage lipid levels in order to decrease CHD risk. See Table 1 for a summary of modifiable risk factors for CHD.

Nursing Implications: Implementing Guidelines into Practice

Nurses need to assess CHD risk in female patients and recommend lifestyle changes to all women as appropriate. Lifestyle recommendations include smoking cessation, following a dietary pattern that is consistent with heart health, incorporating physical activity on a routine basis, and maintaining or losing weight to attain a BMI between 18.5 and 24.9 kg/m². If the person is overweight or obese, a 7–10% weight loss can reduce risk for diabetes and CHD.[52, 53] A woman's perceived barriers to following these guidelines need to be assessed. Barriers to healthy eating, e.g., concerns over taste, insufficient time, the belief that healthy foods cost more, and barriers to physical activity, e.g., lack of time, motivation, costly exercise facilities, have been reported.[54] Additional barriers that nurses can focus on include women's confusion regarding mixed messages about heart health in the media, the misperception that heart health is not that important for women, and the view that providers do not explain exactly how a woman can alter her risk for CHD.[55] In order to help women achieve a healthy weight, nurses can access a document published in 2000, the *Practical Guide to the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*, available at http://www.nhlbi.nih.gov/guidelines/obesity/prctgd_c.pdf. This guide provides detailed information on assessing and treating the overweight or obese patient as well as specific patient educational tools e.g., how to read food labels, lower-calorie food alternatives, and sample reduced-calorie menus for different cuisine preferences.[56] Nurses are in a key position to provide oversight of the implementation of the guidelines to prevent CHD in women as well as support for and reinforcement of successful lifestyle modification promoting heart health.

Conclusion

CHD is the leading cause of death among women, and the risk greatly increases as a woman reaches menopause. Engaging in healthier behaviors including maintaining a healthy weight, leading a non-sedentary lifestyle, and refraining from smoking significantly decreases a woman's risk of developing CHD. Healthcare professionals are instrumental in assisting a woman to identify her risk factors by obtaining an in-depth history, a complete physical assessment, and by determining risk through the use of assessment tools such as the Framingham risk assessment. Nurses can also assess a woman for any perceived barriers that prevent her from participating in an active lifestyle and maintaining a healthy diet. Heart disease can be prevented, and nurses can be instrumental in helping a woman make lifestyle changes to decrease her risk.

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Table 1

Modifiable Risk Factors for CHD Prevention [16]

Risk Factor	Recommendation
Weight	Balance caloric intake and energy expenditure to maintain BMI < 25 kg/m ² . If overweight or obese, strive to reduce weight by 7–10%, or prevent further weight gain.
Sedentary lifestyle	Participate in at least 150 minutes of moderate to vigorous physical activity per week and exercise to increase muscle strength twice per week.
Cigarette smoking	Smoking cessation
Hypertension	Maintain BP < 120/80 mm Hg through diet and exercise or the use of pharmacotherapy.
Hyperlipidemia	Maintain LDL < 100 mg/dl, HDL > 50 mg/dl, and triglyceride levels < 150 mg/dl through diet and exercise. Pharmacologic agents can be used as necessary.