Non-Communicable Diseases Watch

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衞生防護中心 Centre for Health Protection

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A Matter of Your Heart: Coronary Heart Disease

Key Messages

※ Coronary heart disease (CHD) is the most common type of heart disease. In 2013, this disease caused over 8.1 million deaths globally.

※ Major risk factors of CHD include smoking, physical inactivity, unhealthy diet, excessive alcohol consumption, overweight and obesity, elevated blood pressure, suboptimal blood lipid levels, and increased blood glucose levels or diabetes. While CHD typically occurs in middle-age or later, its incidence usually reflects a cumulative exposure to CHD risk factors over decades.

※ In Hong Kong, the age-standardised death rates for CHD decreased from 35.0 per 100 000 standard population in 2001 to 26.6 per 100 000 standard population in 2013. Of 4 007 registered deaths due to CHD in 2013, close to three-fifths (59.4%) were males and over four-fifths (82.1%) were people aged 65 and above.

※ Adoption of a healthy lifestyle is the key to prevent CHD. It includes no smoking; being physically active; eating a heart-healthy diet that is low in fat (especially saturated fat and trans fat), salt and sugars; refraining from alcohol consumption; and reducing stress. In parallel, it can reduce the metabolic risks for CHD.

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18/F Wu Chung House, 213 Queen's Road East, Wan Chai, Hong Kong http://www.chp.gov.hk

A Matter of Your Heart: Coronary Heart Disease

Coronary heart disease (CHD), also known as ischaemic heart disease, is the most common type of heart disease. It happens when the coronary arteries that supply blood to the heart muscle become hardened and narrowed. This is due to atherosclerosis (i.e. gradual build-up of fatty plaques inside the arterial walls) limiting the blood flow to the heart. As a result, the heart muscle cannot get sufficient oxygen it needs. This can trigger angina pectoris (chest pain) and lead to ischaemic heart failure and acute myocardial infarction (heart attack).

Global Situation

According to the Global Burden of Disease (GBD) Study 2013, the age-standardised death rate for coronary heart disease had fallen by more than one-fifth between 1990 and 2013. However, it remains as an important contributor to the risk of death in middle age in all GBD countries and has become the most important cause of global years of life lost with over 8.1 million deaths in 2013 (Table 1).[1]

Table 1: Global deaths from CHD in 1990 and 2013

	1990	2013
Age-standardised death rate (per 100 000 population)	177.3	137.8
No. of deaths (thousands)	5 737.5	8 139.9
Mean rank of global years of life lost	4	1

Risk Factors of CHD

Studies have identified a core set of risk factors of CHD which can act either independently or in combination to produce a synergistic effect on CHD risk. While some of them are non-modifiable (such as advancing age, male sex and family history of heart disease), many are modifiable (Box 1).[2, 3] Independent of traditional CHD risk factors, studies have identified some emerging risk factors that may also increase the risk of CHD. A meta-analysis of 6 large prospective observational cohort studies found that high perceived stress was associated with a 27% increase in CHD risk.[4] Different categories of periodontal disease (including periodontitis, tooth loss and gingivitis) were found to confer an increase, approximately 24% to 35%, in risk of CHD.[5] Of note, risk factors tend to occur together; the more the risk factors, the higher the CHD risk. For example, co-existence of 3 or more metabolic risk factors could increase CHD mortality risk by 3 to 4 times.[6]

Box 1: Major risk factors of CHD

Non-modifiable Risk Factors

Advancing age – Men aged over 40 years and women aged over 45 years are at higher risk than their younger counterparts.[3] In 2010, nearly three-fourths of all CHD deaths worldwide occurred in persons aged 65 and above.[7]

Male sex – CHD is more common in men than women, partly because of the atheroprotective effect of oestrogens at younger ages in women.[8] In Asia, men was found to have 88% increased risk of CHD compared with women.[9]

Family history of premature CHD – Familial risk of CHD is influenced by the number of affected relatives, their degree of relationship, and age at diagnosis. People who had first degree relatives who suffered from CHD were about twice as likely to have the disease as those who had no affected relative.[10]

Modifiable Risk Factors

Smoking – Smoking precipitates atherosclerosis which leads to hardening and blockage of the blood vessels to the heart.[11] Smokers were about 2 to 4 times as likely to develop CHD as non-smokers.[12] Non-smokers exposed to secondhand smoke would also have 25% increased risk of CHD compared with non-smokers not exposed to secondhand smoke.[13]

Physical inactivity – Physical inactivity affects metabolism and reduces cardio-respiratory fitness. A study aimed to quantify the effect of physical inactivity on major non-communicable diseases worldwide found that physical inactivity was associated with 16% increased risk of CHD.[14]

Unhealthy diet – Excess intake of saturated fat and trans fat can cause plagues building up on arterial walls.[15] Besides, diets high in sodium and/or low in potassium are linked to high blood pressure, thereby increasing the risk of CHD. For example, consumption of processed meats (which are high in fat and sodium) was found to be associated with 42% increased risk of CHD.[16]

Excessive alcohol consumption – Alcohol is a known toxin to heart. It can elevate blood pressure and serum triglycerides (a type of blood lipid that can clog arteries). Heavy consumption of alcohol can result in pathological changes of the heart muscle.[17] Compared to the general population, men and women with alcohol use disorders was about 1.6 times and 2.1 times as likely to die of CHD respectively.[18]

Overweight and obesity (including accumulation of abdominal fat) – Overweight and obesity cause adverse metabolic effects on blood pressure, cholesterol, triglycerides and insulin resistance, thereby increasing the risk of CHD. Compared with normal-weight individuals, overweight and obese individuals were about 1.3 times and 1.7 times as likely to have CHD respectively.[19]

Elevated blood pressure – High blood pressure forces the heart to push itself harder and thus leads to thickening and stiffening of the heart muscles. A meta-analysis reported that prehypertension (i.e. systolic blood pressure of 120-139 mmHg or diastolic blood pressure of 80-89 mmHg) could elevate the risk of CHD by 50%.[20]

Suboptimal blood lipid levels – High levels of low-density lipoprotein cholesterol or triglycerides and low levels of high-density lipoprotein cholesterol can predispose to atherosclerosis. A meta-analysis of prospective studies from the Asia-Pacific region found that each 1-mmol/l higher level of total cholesterol was associated with 35% increased risk of coronary death.[21]

Increased blood glucose levels or diabetes – Increased blood glucose levels contribute to CHD risk by activating multiple atherosclerosis mechanisms.[22] Compared with non-diabetes individuals, diabetic men and diabetic women were about 1.9 and 2.6 times as likely to develop CHD respectively.[23]

Local Situation

A retrospective observational study analysed over 179 700 CHD inpatient episodes from all public hospitals among Hong Kong population aged 15 and above during 2000-2009. Results showed that the age-standardised incidence rates of CHD increased from 460.9 per 100 000 population in 2000 to 477.9 per 100 000 population in 2009 for males, but decreased from 290.7 per 100 000 population to 251.1 per 100 000 population for females over the same period. Further analysed by age group, the incidence rates of CHD increased significantly by 10.7% per year among men aged 15-24, 2.2% per year among men aged 35-44 and 4.1% per year for men aged 85 and above, whereas the incidence rates decreased by 1.5% per year among males aged 55-64, 3.0% to 6.7% per year among females aged 35-74 (Table 2).[24]

Between 2001 and 2013, the age-standardised death rates for CHD decreased from 35.0 per 100 000 standard population to 26.6 per 100 000 standard population. Of 4 007 registered deaths due to CHD in 2013, close to three-fifths (59.4%) were males and over four-fifths (82.1%) were people aged 65 and above.[25]

In comparison with Western cities with similar levels of economic development, Hong Kong had a lower CHD death rate (about half of that observed in the United States and the United Kingdom) that might be due to lower prevalence of certain risk factors (notably smoking) and ethnic differences on susceptibility to CHD.[24, 26] However, surveys show that CHD risk factors prevail throughout the community. For example, a cohort study of over 16 000 community-dwelling adults between 2009 and 2011 found that close to one-third (32%) of them suffered from hypertension.[27] According to the International Diabetes Federation's estimation, about one in ten people aged 20-79 had type 2 diabetes.[28] Furthermore, there were an estimated 707 900 smokers in 2012.[29] The Behavioural Risk Factor Survey in 2014 revealed that over three-fifths (62.5%) of people aged 18-64 had insufficient physical activity and close to two-fifths (39.0%) were overweight or obese.[30]

Table 2: Incidence rates (per 100 000 population) of CHD in 2000 and 2009 and annualised percentage change* by sex and age group

Age group	Male			Female		
	2000	2009	Change in rate per year	2000	2009	Change in rate per year
15-24	0.9	1.8	+10.7%	0.2	0.7	-
25-34	9.5	7.7	-	1.8	1.8	-
35-44	70.8	86.7	+2.2%	13.3	9.6	-3.0%
45-54	282.3	290.6	-	91.5	58.5	-5.2%
55-64	860.9	766.5	-1.5%	403.9	234.7	-6.7%
65-74	1 586.0	1 562.1	-	1 049.7	801.1	-4.0%
75-84	1 951.7	2 331.5	-	1 719.1	1 661.2	-
85 and above	2 362.0	3 005.7	+4.1%	2 250.6	2 640.0	-

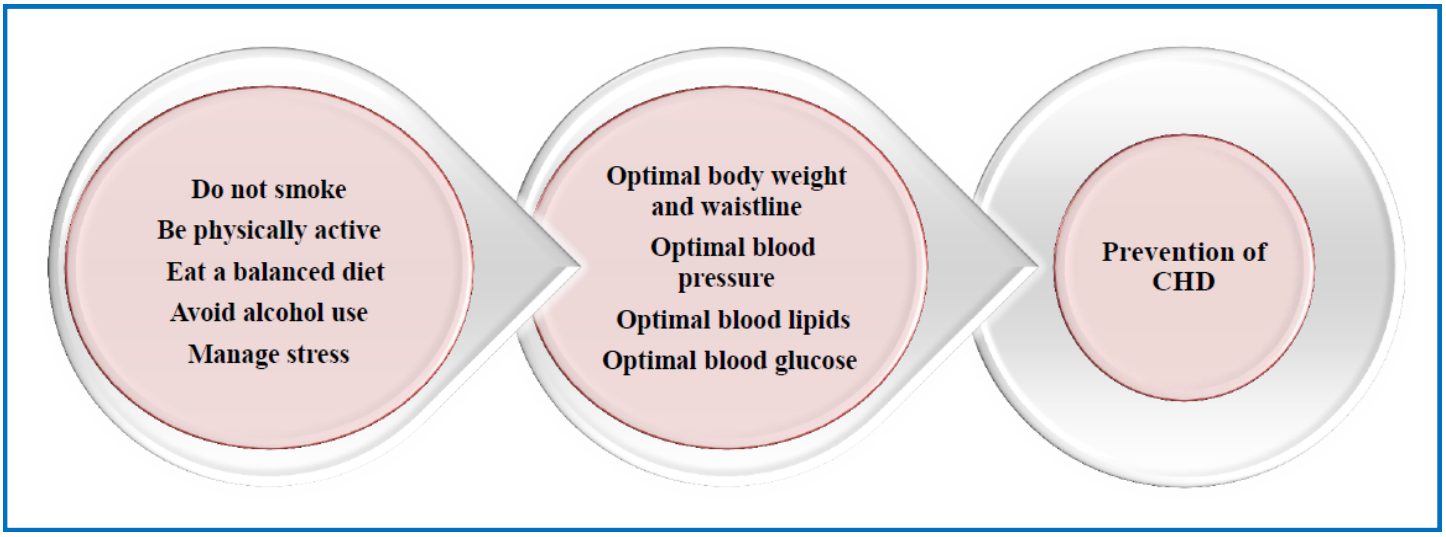
Notes: * Based on Poisson regression and logistic regression models;
'-' Indicated no significant change in trend.

Source: Chau et al, 2013.

Prevention and Control of CHD

CHD typically occurs in middle-age or later. However, the incidence usually reflects a cumulative exposure to CHD risk factors over decades. For atherosclerosis, it can begin in childhood and progress gradually through adolescence and early adulthood, where lifestyle patterns play a great role in influencing its progression.[31, 32] As Figure 1 shows, adoption of a healthy lifestyle can lead to an optimal metabolic profile, thereby retarding the progression of atherosclerosis and reducing the risk of CHD.

Figure 1: CHD prevention pathway by leading a healthy lifestyle



While starting personal preventive measures to control CHD risk factors at any age is beneficial, they are best begun as young as possible and consistently applied over years. Smokers need to be aware that quit smoking reduces CHD risk substantially. The excess risk of CHD caused by smoking would reduce by about half after one year of smoking cessation.[33] Furthermore, individuals who engaged in the equivalent of 150 minutes of moderate-intensity leisure-time physical activity per week would have 14% lowered CHD risk compared with those reporting no leisure-time physical activity.[34] Increased consumption of fruit and vegetables from less than 3 to more than 5 servings a day could also reduce CHD risk by 17%.[35] It is worth mentioning that evidence on possible heart benefit of alcohol consumption remains controversial. A local study found that moderate alcohol use had no effect on CHD mortality in Chinese men aged 65 and above.[36] In fact, alcohol is a cancer-causing agent and associated with many adverse health conditions. For more information about healthy living, please visit the Change For Health website of the Department of Health at http://www.change4health.gov.hk/, or call the 24-hour Health Education Hotline at 2833 0111.

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