

Outline of the Report on Cardiovascular Disease in China, 2010

National Center for Cardiovascular Disease, China

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Abstract

Major and profound changes have taken place in China over the past 30 years. Rapid socioeconomic progress has exerted a great impact on lifestyle, ranging from food, clothing, working and living conditions, and means of transportation to leisure activities and entertainment. At the same time, new health problems have emerged, and health services are facing new challenges. Presently, cardiovascular diseases (CVD) are among the top health problems of the Chinese people, and pose a serious challenge to all engaged in the prevention and control of these diseases. An epidemic of CVD in China is emerging as a result of lifestyle changes, urbanization and longevity. Both national policy decision-making and medical practice urgently need an authoritative report which comprehensively reflects the trends in the epidemic of CVD and current preventive measures. Since 2005, guided by the Bureau of Disease Prevention of the Ministry of Health of the People's Republic of China and the National Center for Cardiovascular Diseases of China, nationwide experts in the fields of epidemiology, clinical medicine and health economics in the realms of CVD, cerebrovascular disease, diabetes and chronic kidney disease, completed the Report on Cardiovascular Diseases in China every year. The report aims to provide a timely review of the trend of the epidemic and to assess the progress of prevention and control of CVD. In addition, as the report is authoritative, representative and readable, it will become an information platform in the CVD field and an important reference book for government, academic institutes, medical organizations and clinical physicians. This publication is expected to play a positive role in the prevention and control of CVD in China. We present an abstract from the Report on Cardiovascular Diseases in China (2010), including trends in CVD, morbidity and mortality of major CVDs, up-to-date assessment of risk factors, as well as health resources for CVD, and a profile of medical expenditure, with the aim of providing evidence for decision-making in CVD prevention and control programs in China, and of delivering the most authoritative information on CVD prevention and control for all citizens.

Key words: Cardiovascular diseases (CVD); Prevention; Control

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INTRODUCTION

The prevalence of risk factors for cardiovascular disease (CVD) is continuously increasing in China. CVD morbidity and mortality remain at a high level. The burden of CVD is substantial and has become an important public health issue. Measures for the prevention and treatment of

CVD in China should be further enforced without delay.

1. PREVALENCE OF CVD

In general, the morbidity and mortality of CVD, including heart disease and stroke, are continuously increasing in the Chinese population. It is estimated

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that the number of patients with CVD is 230 million, of whom 200 million have hypertension, more than 7 million have suffered a stroke, 2 million have had a myocardial infarction (MI), 4.2 million have heart failure, 5 million have pulmonary heart disease, 2.5 million have rheumatic heart disease, and 2 million have congenital heart disease. One in 5 adults is believed to suffer from CVD.

2. MORTALITY OF CVD

The crude death rate of coronary heart disease (CHD) is 94.9 per 100 000 in urban citizens and 71.3 per 100 000 in rural residents. The crude death rate of stroke is 126.3 per 100 000 in urban citizens and 152.1 per 100 000 in rural residents (Figure1, 3).

About 3 million Chinese die of CVD annually, which accounts for 41% of deaths from any cause, and is the leading cause of death in China. The increase in CVD mortality in rural residents is greater than that in urban citizens (Figure2, 4).

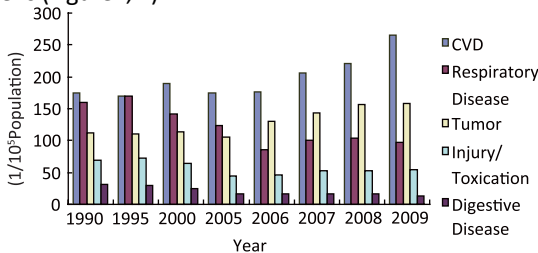


Figure 1. Mortality of major diseases in Chinese rural residents in the last 20 years.

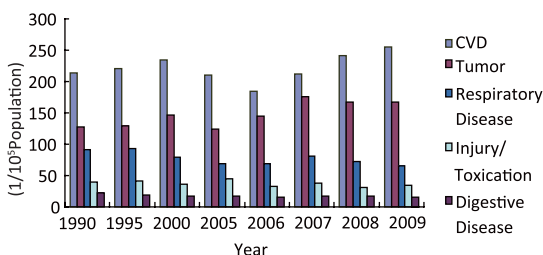


Figure 2. Mortality of major diseases in Chinese urban citizens in the last 20 years.

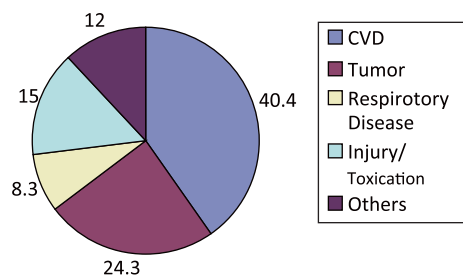


Figure 3. Death constituents of major diseases in Chinese rural residents (%) in 2009.

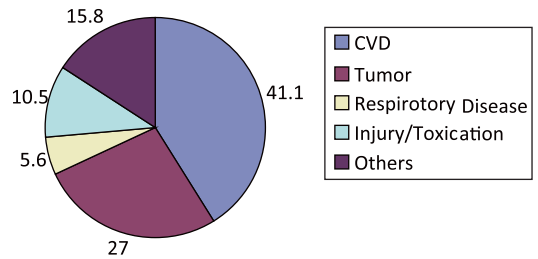


Figure 4. Death constituents of major diseases in Chinese urban citizens (%) in 2009.

3. CONTINUED INCREASE IN PREVALENCE OF CVD RISK FACTORS

3.1 Hypertension

Hypertension is the *major* risk factor for CVD in China. More than half of CVD is associated with elevated blood pressure (BP).

The prevalence of hypertension is increasing steadily. It was 18.8% in adults according to a National Survey in 2002, and rose to approximately 25% in recent years according to reports from various provinces and cities. It is estimated that 200 million Chinese are hypertensive, which means 1 in 5 adults is afflicted by hypertension.

The major risk factors of hypertension are a high-salt diet, overweight/obesity, excess consumption of alcohol, and chronic intensive stress. Some studies suggested that the prevalence of hypertension is increased by a factor of 3 in patients with obesity (body mass index (BMI) ≥ 28 kg/m²) and by a factor of 2 in overweight patients (BMI, 24.0-27.9 kg/m²) in comparison with that in individuals of normal weight (BMI <24 kg/m²).

A long-term follow-up study showed that 2.33 million CVD deaths annually were associated with elevated BP (2.10 million due to hypertension, and 0.22 million due to high normal BP), of which 1.27 million were premature CVD deaths (1.15 million due to hypertension, and 0.12 million due to high normal BP).

Relationship between Subtypes of Hypertension and Risk of CVD Death

Compared with normotensives, the odds ratio for CVD death is 1.68 (95% confidence interval, 1.58-1.78) in patients with isolated systolic hypertension, 1.45 (1.27-1.65) for isolated diastolic hypertension, and 2.53 (2.39-2.68) for combined systolic/diastolic hypertension. Compared with normotensives, the odds ratio for CVD death after antihypertensive treatment is 1.61 (1.28-2.08) in hypertensive patients with BP <140/90 mmHg, and

2.88 (2.60-3.09) in patients with BP >140/90 mmHg. The risk of CVD death is significantly reduced in hypertensive patients attaining the optimal target BP.

Prevalence of High Normal BP The identification of patients with high normal BP was greater in 2002 than in 1991. It is reported that, compared with normotensives, the risk in patients with high normal BP is increased by 56% for stroke, 44% for CHD, and 52% for all CVD. Close attention should be paid to patients with high normal BP in the prevention of hypertension.

Hypertension in Children Hypertension in children is associated with weight gain. Secondary hypertension accounts for half of the hypertension in children and should be taken into consideration.

3.2 Smoking

Smoking is an important risk factor for CVD in China. The prevalence of smoking in males has reached a plateau, but is slightly increasing in young females. There are 350 million active smokers and 540 million passive smokers. Although non smoking rates have improved a little in the population older than 15 years, the battle against cigarette smoking is still challenging.

3.3 Dyslipidemia

The levels of plasma lipids in the Chinese population have been rising in recent years, and the increase in juveniles is of particular concern. According to a National Survey in 2002, the prevalence of dyslipidemia was 18.6% in adults, of which 2.9% was hypercholesterolemia (total cholesterol (TC) \geq 5.72 mmol/L), 11.9% was hypertriglyceridemia (triglyceride \geq 1.70 mmol/L), and 7.4% was a low high-density lipoprotein cholesterol level (<1.04 mmol/L). It is estimated that dyslipidemia affects at least 200 million individuals, with hypercholesterolemia the main risk factor for CVD (specifically CHD).

3.4 Diabetes Mellitus

Diabetes mellitus is a common chronic disease and is also a potential risk factor for CVD.

The prevalence of diabetes mellitus is increasing rapidly in China and is associated with changing lifestyles. A survey was conducted by the Chinese Diabetes Society in 14 provinces to investigate the prevalence of diabetes mellitus in residents \geq 20 years of age in central cities and in the nearby countryside, with the measurement of fasting blood glucose and the oral glucose tolerance test. The age-standardized prevalence of diabetes mellitus was 9.7%, which was

much higher than that in 2002. The prevalence of diabetes mellitus increases with age and BMI.

A long-term follow-up study of diabetes prevention in Daqing suggested that lifestyle intervention in patients with impaired glucose tolerance can prevent or postpone the occurrence of diabetes mellitus.

3.5 Overweight/Obesity

Overweight/obesity is a pivotal risk factor for CVD. According to a survey in 2002, the prevalence of overweight was 17.6% and that of obesity was 5.6%. It is estimated that the number of individuals with overweight and obesity may be as high as 240 million and 70 million, respectively. The prevalence of overweight/obesity in both children and adults is growing steadily, and is worthy of note.

3.6 Physical Inactivity

Physical inactivity is a risk factor for CVD. Lack of activity can lead to overweight/obesity, hypertension, dyslipidemia, hyperglycemia and elevated risk of CVD. An investigation in 9 provinces and cities showed that physical activity had decreased in young and middle-age residents. Physical activity in 2006 declined by 27.8% in males and by 36.9% in females in comparison with those in 1997. A 2005 survey of physical health in college students aged 19-22 years indicated that in comparison with 1985, physical functionality had decreased markedly while there was a corresponding increase in the prevalence of overweight/obesity, suggesting that the physical activity of college students was on a downward trend.

3.7 Diet and Nutrition

In general, the diet changed markedly in recent years, but some features of diet are still problematic. The intake of grain decreased significantly, whereas the intake of fat increased dramatically. The daily intake of salt (15.9 g/d) was much greater than recommended, i.e., >6 g/d. The intake of vegetables and fruits was also insufficient.

3.8 Metabolic Syndrome

According to the Chinese National Nutrition and Health Survey in 2002, the prevalence of metabolic syndrome in individuals aged \geq 18 years was 6.6% (as diagnosed by Chinese Diabetic Society criteria) or 13.8% (as diagnosed by Adult Treatment Panel III criteria).

4. MAJOR RESEARCH ON INTERVENTION AND PREVENTION OF CVD

4.1 Coronary Artery Disease (CAD)

According to a registry study, percutaneous coronary intervention (PCI) has increased rapidly in mainland China. The number of PCIs was 182 312 in 2008, 26% greater than in 2007. In 2007, PCI could be performed independently in 870 hospitals. The number of hospitals where >100 PCIs were completed annually was 299, which accounted for 34.4% of the aforementioned hospitals.

In 2008, 1.39 out of 10 000 individuals received PCI, which could be performed independently in 1 061 hospitals. The average number of PCIs was 172 for each hospital. The number of hospitals where >400 PCIs were completed annually was 94 (8.86%).

Effect of glucose level on early mortality of acute MI (AMI). The 30-day mortality of AMI increases with glucose level above 4.5 mol/L at hospitalization. The risk of mortality in patients with glucose level >11.0 mmol/L was increased by a factor of 3 in comparison with that in patients with glucose level of 4.5-5.5 mmol/L.

Observational data from 52 medical centers in 6 cities of China indicated that a large proportion of outpatients received lipid-modulating treatment, but the control rate was low.

Research on secondary prevention of CHD in China suggested that the risk of cardiovascular events and mortality could be greatly reduced by treatment with Xuezhikang, a cholestin extract, in hypertensive patients with prior MI.

4.2 Stroke

Stroke has reached epidemic proportions in the Chinese population. According to a survey on 340 000 deaths from 1999 to 2004 in Tianjin, cerebrovascular disease, heart disease, and malignant tumors ranked as the 3 leading causes of death. Analysis on the subtypes of stroke indicated that the proportion of deaths from cerebral infarction increased gradually, while that of cerebral hemorrhage decreased. The standardized mortality ratio of stroke displayed a declining trend.

Secondary Prevention of Stroke

(1) The Post-stroke Antihypertensive Treatment Study (PATS) in China demonstrated that cerebrovascular disease could be prevented by treatment of hypertension with diuretics. The risk of recurrent stroke was reduced by 31% and that of

cardiovascular events by 25%. Antihypertensive treatment is beneficial for secondary prevention of stroke.

(2) A prospective registry study in 23 hospitals showed that the risk of all-cause deaths and recurrent cerebrovascular events could be reduced by antiplatelet therapy in adult patients who had a stroke in the previous 6 months.

4.3 Chronic Kidney Disease

An Investigation by the Chinese Society of Blood Purification in 27 provinces in 2007 and showed that 65 074 patients with end-stage renal disease (ESRD) were receiving hemodialysis or peritoneal dialysis. This number increased to 102 863 by the end of 2008. The major causes of death from ESRD were cardiovascular complications, stroke and infection.

4.4 Cardiac Surgery

Number of Cardiac Surgeries in China The number of cardiac surgeries in mainland China was 157 444 in 2009, which was increased by a factor of 8.7% compared with that in 2008. Of these surgeries, 128 358 were performed on-pump.

Congenital Heart Disease According to a survey in 2007, the prevalence of congenital heart disease was 8.2‰ in 84 062 newborn babies in Beijing. In surviving infants with congenital heart disease, 34.0% had a ventricular septal defect, 23.7% had a patent ductus arteriosus, and 10.8% had an atrial septal defect.

Data from 18 hospitals showed that in 36 072 patients with congenital heart disease treated with interventional therapy by the end of March 2008, the incidence of complications was 1.97%-4.45%, and the death rate was less than 0.11%.

4.5 Heart Failure

According to a survey from 20 towns and rural areas in 10 provinces and cities, the incidence of chronic heart failure in the population aged 35-74 years was 0.9%. There were 4 million patients with heart failure in China. The prevalence was higher in females than in males, and was higher in the north than in the south.

4.6 Peripheral Artery Disease (PAD)

The prevalence of PAD varies substantially among different samples of the Chinese population. For example, it was 2.1% in Zhoushan fishermen, 6.0% in the native population older than 35 years in Beijing, 2%-4% in native populations of multiple domestic

regions, 16.4% in the elderly population (>60 years) in Beijing, 19.4% in patients with diabetes mellitus, 22.5% in patients with metabolic syndrome, and 27.5% in hypertensives. However, the prevalence of PAD increases with age in various populations, and is higher in females than in males.

4.7 Arrhythmia

In 2006, 20 000 patients underwent permanent cardiac pacemaker implantation in China.

The number of patients who were treated with radiofrequency ablation was 20 000 in 2006, and demonstrated an upward trend.

The number of atrial fibrillation patients undergoing radiofrequency ablation grow fast.

The incidence of sudden cardiac death in China is 42 per 100 000 persons. It is estimated that 540 000 sudden cardiac deaths occur annually.

5. COMMUNITY-BASED PREVENTION AND TREATMENT OF CVD

In the late 1960s, a Hypertension Disease Management Program was initiated in the Capital Steel Corporation and achieved gratifying successes. The incidence of stroke was reduced considerably by 50%. Various studies on the prevention and treatment of CVD were carried out thereafter. A specific management program for hypertension-associated disease was launched in Shanghai in 2006, where a health management specialist bridged the communication between patients and doctors, and was in charge of the follow-up. After 1 year, the rate of BP control in the intervention group was increased by 47% in comparison with that of the reference group, along with a reduction in plasma total cholesterol and BMI.

6. COSTS OF CVD

6.1 Number of Patients with CVD Discharged from Hospital

7.4 million patients with CVD (including cerebrovascular disease) were discharged from hospital in 2008, which accounted for 10% of the total discharged. Of these, heart disease patients accounted for 3.85 million (5.2%), and cerebrovascular disease patients for 3.56 million (4.8%).

Most CVD patients discharged from hospital in 2008 had ischemic heart disease (2.41 million) and cerebral infarction (2 million), accounting for 32.5% and 27.1% of CVD patients, respectively. The other

discharged patients had hypertension (1.24 million), diabetes mellitus (1.24 million), cerebral hemorrhage (0.91 million), and rheumatic heart disease (0.2 million).

The average increase in the number of CVD patients discharged (8.28%) during 1980-2008 was more rapid than that of all diseases (5.27%). The average increase in discharge rates was highest for diabetes mellitus (13.57%), followed by cerebral infarction (11.19%), and hypertension (7.11%).

6.2 Costs of CVD Hospitalization

The cost of hospitalization in 2008 was 2.45 billion RMB for AMI, 8.07 billion RMB for cerebral hemorrhage, and 12.7 billion RMB for cerebral infarction. The annual increase in expenses for hospitalization since 2004 were 36.5%, 26.9%, and 31.1%, respectively, for each of the above diseases.

The expenses for each hospitalization was 12566.2 RMB for AMI, 8488.5 for cerebral hemorrhage, and 6046.6 for cerebral infarction. The annual increase in expenses for each hospitalization since 2004 were 9.68%, 5.7%, and 2.69%, respectively, for the above diseases.

6.3 Cost of Medicines to Treat CVD

The total cost of drugs in hospitals with ≥ 100 beds was 256.603 billion RMB in 2009, of which 30.39 billion was expended on medicines to treat CVD.

APPENDIX

National Center for Cardiovascular Disease, China. Overview of the Center and the Report

The National Center for Cardiovascular Disease Control and Research, China was officially founded on September 3rd, 2004 by the Ministry of Health. The Center is located in the Cardiovascular Institute and Fu Wai Hospital, Chinese Academy of Medical Sciences. The Ministry of Health has afforded the Center the responsibility for cardiovascular disease (CVD) research, prevention and control.

Though the purpose of the Center is to guide CVD prevention and research, it also embodies the spirit of an era of preventive medical science. In recent years, lifestyle changes in China have resulted in CVD becoming the major cause of death. CVD is characterized by high incidence, high disability rate, high death rate and very high treatment cost, and is causing poverty, especially in the countryside. This disease is therefore a major obstacle in the construction of a prosperous modern society.

Furthermore, the prevalence of cardiac risk factors is increasing rapidly, suggesting further future increases in CVD incidence and its consequences. The rapid development of the economy is likely to be affected, and the great plan of establishing a prosperous, modern society will be difficult to realize if this trend cannot be controlled.

In reaction to this, the Ministry of Health founded the National Center for Cardiovascular Disease, China to face the enormous challenges from CVD, to make advances in its prevention and control, and to create a favorable environment for labor and business to boost the social and economic construction of the country.

The remit of the Center is to effectively slow, stop and then decrease the accelerating incidence of CVD in China, through organization, coordination and promotion of research, prevention and control. Its objectives are to provide evidence for decision-making in CVD prevention and control programs in the country; to provide health services and training, and to distribute modern technology in CVD prevention and control; to provide the most authoritative information for the public to aid in the prevention and control CVD; and to organize, coordinate, implement and evaluate national projects in CVD prevention and control.

The Functions of the Center Include

1. Under the tutelage of the Ministry of Health, the Center is devoted to the research, development, constitution and standardization of effective policies, information, methods, technology and professional guidelines in the field of CVD prevention and control in China.

2. The Center is devoted to exploration of a new model of health management services. This model cares for people rather than disease, gives priority to prevention and integrates prevention and treatment into one system. The model manages the lifetime course of the disease with regard to prevention and control. In addition, the Center will develop relevant technology that can be gradually disseminated to the whole country.

3. The Center is setting up a nationwide network for CVD prevention and control.

4. The Center is providing high level professional training in CVD prevention and treatment.

5. The Center is promoting academic exchanges and enhanced international cooperation in the area of

CVD prevention and control.

Under the National Center for Cardiovascular Disease, an expert committee was established, including a subcommittee on hypertension prevention and control and a subcommittee on dyslipidemia prevention and control, responsible for policy consultation, academic conformity, technology support, project leadership and guideline development. The Center has three sections. The Epidemiology and Evidence-based Medicine section mainly focuses on scientific research and research in policy development in CVD prevention and control. The Health Management section is mainly responsible for conducting the translation and application of scientific research knowledge, developing practical and effective technology, and offering adequate services of health management to the public. The Network for Prevention and Control section is in charge of setting up a 3-grade network for cooperation in CVD prevention and control, providing training and disseminating technologies, organizing and implementing national programs in CVD prevention and control, and promoting nationwide CVD prevention and control.

A vast amount of data from China and abroad has shown that effective control of the major risk factors can result in a 75% reduction in the incidence of CVD. We are convinced that we can effectively reduce the health risk of CVD in China by national joint efforts. Governmental and non-governmental agencies, academic institutions and associations, public and private sectors, individuals and all those dedicated to prevention and control of CVD can fight together toward this goal, and it will surely be achieved.

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