

## Editorial

### Prevention & control of CVD in women & children in India

The Global Burden of Disease Study has reported that ischaemic heart disease and stroke are the most important causes of death and years of life lost and one of the most important causes of disability and mortality in women<sup>1</sup>. The report on causes of death by the Registrar General of India also reported cardiovascular diseases (CVD) as the most important cause of death in women<sup>2</sup>. Of the more than 10 million deaths annually in India, almost two million are due to diseases of circulatory system, of which 40 per cent are women. Among women, these diseases are the major cause of death, in the middle age, in urban and in rural women living in poor or rich States<sup>3</sup>. More than half of the 800,000 annual CVD deaths in women occur prematurely<sup>2</sup>.

**Risk factors:** There are no prospective studies that have evaluated association of risk factors with CVD incidence in India. Risk factors for premature coronary heart disease (CHD) and stroke have been studied in case-control INTERHEART and INTERSTROKE studies<sup>3</sup>. Nine standard risk factors explain more than 90 per cent of CVDs and include high apolipoprotein B, low apolipoprotein A1, high blood pressure, diabetes, high waist-hip ratio, smoking or tobacco use, sedentary lifestyle, psychosocial stress, poor quality diet and alcohol; same risk factors are important in South Asian subjects<sup>4</sup>. Among women, smoking causes less population attributable risk (due to its low prevalence) while metabolic risk factors such as dyslipidaemia, hypertension, diabetes and high waist-hip ratio are more important<sup>5</sup>.

All these risk factors are highly prevalent in Indian women. The Second and Third National Family Health Surveys (NFHS) reported that smokeless tobacco use

was particularly high in Indian women<sup>6</sup>. Comparison of NFHS-2 and NFHS-3 showed that smoking was increasing among women, more among the illiterate and low educational and socio-economic status<sup>6</sup>. NFHS also reported a greater prevalence of obesity in Indian women as compared to men with an increasing trend in overweight and obesity<sup>7</sup>. Studies from different regions of the country have reported a high prevalence of cardiometabolic risk factors in women<sup>8</sup>. Hypertension was found to be more prevalent in middle aged and older women as compared to men. Hypercholesterolaemia is equal in men and women while low HDL cholesterol is more common in women<sup>8</sup>. Higher prevalence of metabolic syndrome and diabetes in women has been reported as compared to men<sup>9</sup>. Clearly, women in India are at a much higher cardiometabolic risk of CVD than men, especially after they lose their hormonal protection at menopause.

Risk factor studies among children are limited. Obesity is on the rise in children, especially among girls in urban schools and the middle-class<sup>9</sup>. Studies from different regions of the country have reported a high prevalence of childhood obesity, especially in urban school going girls. High blood pressure and type-2 diabetes are emerging as important problem in adolescent children, more in girls<sup>9</sup>. Tobacco use and smoking is rampant in rural children and in urban slums, although lower in the girls as compared to boys<sup>8</sup>.

Premature CVD is largely preventable<sup>10</sup>. Multilevel and multifactorial approaches using a combination of changes in policy, healthcare programmes, process implementation, physician education and task shifting, practice paradigm shift, population-wide interventions, primary prevention, better patient management and

patient empowerment can lead to substantial reduction in the mortality and burden of CVD in women as well as in men (Table).

**Primary prevention:** Two preventive strategies are useful - population-based intervention and high risk individual based intervention<sup>10</sup>. Population based strategies have mainly focussed on CVD and their risk factors. Multiple studies have been performed over the years<sup>11</sup>. It has been reported that most of the interventions improved knowledge, some improved practices, while almost all failed to influence risk factors or disease outcomes, especially CVD outcomes<sup>11</sup>. All these studies are from high and high-middle income countries. Of the three studies available from India, one has focussed on young adults<sup>12</sup>, another on male industrial workers<sup>13</sup>, and the third on women<sup>14</sup>.

Pandey *et al*<sup>14</sup> reported influence of a multilevel intervention to improve CVD-related knowledge and practices in lower-middle socio-economic status middle-aged women in urban and rural locations in India. At the end of six months intervention, there was an increase in knowledge but practices did not change significantly. Prabhakaran *et al*<sup>13</sup> performed a quasi-randomized study on benefits of a multilevel population-based intervention among industrial populations and reported that after a mean of three years men and

women in intervention clusters had lower body mass index, waist size, blood pressure and cholesterol.

Studies among children are limited. A systematic review has reported that population based interventions can reduce body mass index and obesity in children<sup>15</sup>. A beneficial effect on levels of blood pressure and lipids was also reported. MARG study<sup>16</sup> reported that a medium term school based intervention that targeted children, parents and school environment improved knowledge and behaviours, although the influence on anthropological parameters was small. More studies are required among women and particularly on children in India as change in diet and other lifestyle factors influence risk factors in adulthood.

**Risk factor control:** Control of important risk factors such as hypertension, diabetes, hypercholesterolaemia and metabolic syndrome can lead to substantial reduction of cardiovascular risk in women<sup>10</sup>. There are no prospective studies that have evaluated influence of risk factor control on cardiovascular outcomes in India. Meta-analyses of international studies on hypertension control for primary prevention have reported that 10 mm Hg reduction of blood pressure is associated with significantly lower mortality over a 10-year period, and the risk reduction is similar in men and women<sup>17</sup>. Lowering of total cholesterol and LDL cholesterol with

**Table.** Nine P's of prevention

Domain	Intervention
1 Policy change	Appropriate policies related to smoking, tobacco use, alcohol abuse, dietary fats and trans-fats intake, fruits and vegetable intake, increased physical activity, school health programmes, worksite intervention, public health education and promotion of health literacy.
2 Programme development	Specific programmes to address four major behavioural domains- smoking/tobacco use, alcohol abuse, healthy diet, physical activity; three risk factors- high blood pressure, high cholesterol and diabetes; and better disease management.
3 Process implementation	Development and implementation of suitable practice algorithms for use by various healthcare professionals and other stakeholders.
4 Physician education	Medical education to be focused on all the major health problems in the country; specific focus on non-communicable diseases. Changes in undergraduate and postgraduate education for all healthcare providers.
5 Practice paradigm shift	Shift from ad-hoc acute disease model to continuous care chronic disease model.
6 Population-wide interventions	Interventions to control primordial cardiovascular risk factors- smoking, alcohol abuse, physical inactivity and unhealthy diet.
7 Primary prevention	Control of important risk factors- smoking and tobacco use, high blood pressure, high LDL cholesterol, low HDL cholesterol, diabetes and the metabolic syndrome using appropriate lifestyle and therapeutic strategies.
8 Patient management	Acute cardiovascular care with coronary care and stroke units. Effective long term care and secondary prevention.
9 Patient empowerment	Promotion of risk factor and disease self management; medication and lifestyle adherence.

statins is associated with 25-40 per cent lower risk of CHD events and deaths, similar in men and women<sup>18</sup>. Studies that have evaluated results of lowering high triglyceride or increasing low HDL cholesterol, are so far inconclusive<sup>10</sup>. Benefits of tight control of diabetes for CVD primary prevention are not clear. The Indian Diabetes Primary Prevention Study reported a substantial benefit of exercise as well as metformin use for prevention of diabetes in both men and women<sup>19</sup>. Cardiovascular outcomes were not reported. Studies regarding incidence of cardiovascular outcomes with primary prevention strategies are required.

Population based epidemiological studies in India have reported significant gaps in the awareness, treatment and control of various risk factors<sup>8</sup>. Hypertension awareness ranges from 20 to 60 per cent, is lowest in rural women and highest in urban men; less than a quarter subjects with hypertension are treated in rural areas while about half are treated in urban locations. Blood pressure control status is dismal and varies from 10 per cent in rural locations to 20 per cent in urban locations<sup>18</sup>. Lower rates have been reported in Indian women and a study on urban and rural lower-middle class women reported hypertension awareness, treatment and control of 57, 23, 6 per cent in urban and 25, 13 and 1 per cent in rural women, respectively<sup>20</sup>. Awareness, treatment and control status of other risk factors such as high cholesterol, high triglycerides and low HDL cholesterol are not well studied in India. A multi-site study in urban subjects reported hypercholesterolaemia ( $\geq 200$  mg/dl) prevalence of 25 per cent and awareness, treatment and control in 17.5, 7.5 and 4.5 per cent men and 13.2, 6.7 and 3.7 per cent women<sup>21</sup>. Status of diabetes awareness, treatment and control has been reported to be greater in urban women than men and remains to be studied in rural areas<sup>22</sup>. No similar studies exist in children. Low prevalence of hypertension, hypercholesterolaemia and type 2 diabetes has been reported among the adolescents in India<sup>9,16</sup>. Nationwide studies are required to evaluate status of CVD risk factor awareness, treatment and control in India, and more studies are needed to identify strategies to increase their control.

#### ***Disease management and secondary prevention:***

There are gender biases in access to care for acute and chronic CVD management in India<sup>23</sup>. The CREATE registry (20,468 patients)<sup>24</sup> reported that delays in presentation in acute coronary syndrome (ACS) was significantly more in women as compared to men. Women also had higher prevalence of risk factors,

and received inferior quality of treatment, especially thrombolysis and coronary interventions for acute ST elevation myocardial infarction. Mortality was higher in women as compared to men. Reasons for lower awareness of symptoms, delays in access to care, and inferior quality of treatment for ACS in women should be evaluated in prospective registries using qualitative methods.

Status of long term cardiovascular disease management and secondary prevention is very poor in low income countries such as India<sup>23</sup>. The Prospective Urban Rural Epidemiology (PURE) study reported that use of four evidence based medicines- aspirin, beta blockers, ACE (angiotensin converting enzyme) inhibitors or angiotensin receptor blockers (ARBs) and statins- at a median of three years after diagnosis was highest in high income countries and lowest in low income countries<sup>25</sup>. Use of these drugs was significantly lower in women than in men. In a prescription audit study from Rajasthan a significantly lower use of beta-blockers in women was reported<sup>26</sup>. More studies are required to evaluate barriers to care and promoters to adherence in women with CVD.

In conclusion, CVDs, both CHD and stroke, are the most important causes of mortality and morbidity in Indian women. Standard risk factors that are operative in men are equally important in women. These are driven by changing lifestyles, low physical activity, high calorie intake and high fat diet. Status of awareness, treatment and control of these risk factors is low, especially among rural women. Reasons for gender bias in acute as well as chronic cardiovascular disease management need more studies. There are very limited data on prevalence, prevention and management of cardiovascular risks in children. Focus on prevention approaches (Table) is essential to reduce cardiovascular mortality and morbidity among women and children.

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