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CARDIOVASCULAR DISEASE - RISE IN INDIA: NURSES ROLE TO CURB THE MENACE

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ABSTRACT

Cardiovascular disease is the foremost public health concern, leading to premature deaths and morbidity across all states of India. The increasing burden of cardiovascular diseases is one of the chief threats to sustainable development of the country. Although the incidence of CVD has shown a reverse tendency in developed countries because of the remarkable advances in the health sector, the same cannot be held true for low and middle income countries, which include India. Hence so many researches has been carried out in various parts of the world to find out the most effective and cost efficient way of preventing the rising menace of CVD. Many well-known associations and prominent persons in the health field have illustrated the role of nurses in preventing this growing trend of CVD around the globe as the nurses have been spending much of their working time with patients. As a significant health team member, nurses can play a vital role to reduce the occurrence of CVD as well as to promote the cardiovascular health of patients through a number of ways. Significant evidences exist to support a systematic approach in the reduction of CVD risk through team based, nurse directed case management.

I. INTRODUCTION

Cardiovascular disease (CVD) is an expanding concern around the globe accounting for 17.9 million deaths in 2016, representing 31% of all global deaths, and it is projected to increase to 23.6 million by 2030.[1] More than 75% of these death had been reported in the developing countries, in 2016. Owing to the rapid industrialization, urbanization, and related lifestyle changes, the mortality rate from CVD is on the rise in middle and low income countries, in the past two decades.[2] Particularly, this is valid on south Asian countries like India. However, the same cannot be held true for developed countries.[3]

India is going through a prompt epidemiologic transition whereby the consequence of communicable diseases have been declined gradually, but it is not confirmed in the case of non-communicable diseases (NCD), which has been risen spontaneously, thus leading to a dual burden.[4] For Instance, as per the study findings rural people of India had been documented with two-fold rise in the CAD occurrence. Likewise, urban adults are also reported with a 6-fold rise in CAD incidence, during the period from 1960 to 2002.[5] This huge threat of CAD in India is the consequence of a large population as well as high prevalence rate of CAD risk factors.

The worldwide individual and societal costs related to cardiovascular disorders are enormous as these diseases tend to affect the people in their most productive years of lives. The negative impact of this burgeoning disease not only affects the developing and under developed countries but the developed countries are also being challenged. The United States, for example, the economic cost (direct medical expenditures plus lost productivity costs) of CVD is exposed to reach $1.1 trillion annually by 2030.

Although a myriad of both modifiable and non-modifiable factors contribute to the worldwide epidemic of CVD, the accumulated data and clinical observations clearly underscore the major role of life course prevention.[6] Therefore, CVD prevention is increasingly recognized as a challenge and opportunity at the global level and for every nation. Since then, many national and International level research studies have been focused on the best ways to implement effective and cost efficient prevention strategies. To improve patient outcomes, a multidisciplinary team- based approach has been proposed. A multidisciplinary team comprising of health care professionals with expertise in nursing, dietetics, physical activity, psychologists, social workers, and behavioral skills have reflected high levels of success in the preventive efforts, especially in high-risk and

vulnerable populations. Among the multidisciplinary team, nurses are the ideal health care professionals to direct the CVD risk reduction team and a nurse can spend more time with the patients than any other health care professionals to deliver multifactorial risk reduction in hospital settings, outpatient clinics, and in community-based facilities. Moreover, it is evident from many studies that a team-based, nurse-directed case management has the potential to effect positive change in both primary and secondary prevention of cardiac and other vascular diseases.[7-10]

Bodenheimer and colleagues,[11-13] called attention to the pivotal role of nurses in the health care team in improving care for chronic diseases and in their evaluation of ways to improve primary care in the United States, to address the growing needs of the chronic disease management. Further, the American Heart Association (AHA) and the World Health Organization (WHO) also exemplified the key role that nurses have in supporting the goal to reduce death and disability from CVD by 25% in 2025.[14,15]

Twelve million nurses around the world, forms the largest health care discipline managing CVD risk factors and chronic disease[16]. By taking on a fundamental role as team leaders in providing case management, nurses have proven their capability not only to reduce CVD risk factors, but also adhere to treatment guidelines, decrease number of stay in hospital, and to reduce morbidity and mortality. Most of the nurse coordinated actions and programs have demonstrated the improved outcomes and cost effectiveness in both developing and developed countries.[17-19]

II. Rising Tendency of Cardiovascular Disease In India

At the beginning of this century, cardiovascular diseases became the leading cause of disease burden and mortality in India. Besides, it is reported in many scientific studies that there has been an alarming rise in the prevalence of CHD (coronary heart disease) and CVD (cardio vascular disease) mortality in India and other south Asian countries. The reason for one in 4 deaths in India are, now, because of cardiovascular diseases. This burgeoning burden of CHD in India can be explained by the alarming rise in the prevalence of coronary risk factors such as diabetes mellitus, high blood pressure, hypercholesteremic state, smoking, central obesity and lack of exercise. This increase in prevalence of risk factors is driven by industrialization, rapid urbanization and change in related lifestyle changes.[20] Most of the risk factors of CAD are extensively prevalent in India. Based on the study report, India has one of the largest populations of diabetics (over 32 million) with a projected escalation to 57.2 million in 2025.[21] High mortality rates, premature CHD, and increasing burden are the striking features of CVD epidemiology in India.

According to World Health Organization, the south Asian region has one of the highest cardiovascular mortality rates in the world.[22] Age-adjusted CVD mortality rates in countries of this region vary from a low of 179/100,000 in men and 153/ 100,000 among women in Bangladesh to a high of 349/100,000 among men in India and 294/ 100,000 in women in Pakistan. In India, the age-adjusted CVD mortality rates are 349/100,000 in men and 265/100,000 in women. These rates are >2-3 times greater than in the United States, where rates are 170/100,000 in men and 108/ 100,000 in women.[23] Moreover, the WHO also had pointed out that in 2010, non-communicable diseases led to 5.87 million deaths globally and in India, it led to 1.2 million deaths in men and 0.9 million deaths in women. These numbers are much more than in any other country in the world except China.

In India, the prevalent rates of cardiovascular diseases are on the rise, for the last 60 years. In 1990, the prevalent rates of cardiovascular diseases was 25.7 million. But, by the year 2016 it had raised to 54.5 million. Not only the morbidity rate but the mortality rate, due to cardiovascular diseases, also has been increasing in India. Mortality rate due to cardiovascular diseases had been increased during the period: 1.3 million in 1990 (which is 15.2% of total deaths) and 2.8 million in 2016 (28.1% of total deaths). Likewise, the office of the RGI (Registrar General of India) also has reported an increasing trend in proportionate CVD mortality. Based on these report in 1980s and 1990s, CVD led to 15%-20% of deaths in the country.[24] In 1990, the reported mortality rates were 20.6%, 21.4% in 1995, 24.3% in 2000, 27.5% in 2005, and 29.0% in 2013.[25] These figures were based on the rural health surveys. In India, generally it was reported that CVD led to 20.3% of these deaths in men and 16.9% of all deaths in women with an annual mortality rate of over 10.5 million.[26]

Concerning the mortality rate due to coronary heart disease (CHD), it leads to 17% of the total deaths and 26% of adult deaths in 2001-2003, which had increased to 23% of the total deaths and 32% of adult deaths by the period of 2010-2013.[23] In addition to that, the World Health Organization (WHO) and Global Burden of Disease Study also have highlighted the increasing trends in years of life lost (YLLs) and disability-adjusted life years (DALYs) from CHD in India. The Global Burden of Diseases Study explained that the disability adjusted life years lost by CHD in India during 1990 was 5.6 million in men and 4.5 million in women; the projected figures for 2020 were 14.4 million and 7.7 million in men and women respectively.

A good number of other researches and studies, also, highlights the rising tendency of cardiovascular diseases and CHD in India. The Global burden of disease study has informed that both mortality rates and disability rate from CHD has been doubled in India in the last three

decades. It has explained the absolute number of persons dying from CHD, which also has increased from 0.62 million in 1990 to 0.78 million in 1995, 0.95 million in 2000, 1.01 million in 2005, and 1.13 million in 2010.[27] Similarly, the proportions of years of life lost (YLLs) as a result of CVD was 5.1% in 1990 and 9.8% in 2010. It is the same manner round in case of years of life lost from CHD which also had been doubled from 3.3% in 1990 to 6.7% in 2010.[28] It reflects premature mortality from this particular disease. High premature mortality from CVD also has been reported in the Million Death Study[29] For instance, in 2010, out of a total of 1.89 million annual deaths, 0.59 million (31%) occurred at age <60 years and 1.09 million (58%) at age <70 years. Therefore, it's a high time to take an action against the premature occurrence of CHD in India and other developing countries.

In another study, the prospective urban and rural epidemiological study,[30] report that low income countries (India, Pakistan, Bangladesh, and Zimbabwe) had higher CVD mortality rates compared to the high- and middle-income countries. Based on the study findings from 155,000 samples (age group of 35-70 years) of low, middle and high income countries, low income countries had shown higher CVD mortality rates. In this study the Low-income countries (n ¼ 33,834) were predominantly represented by India (n ¼ 29,258). In low income countries the yearly incidence of fatal CVD was 4/1000, which was significantly higher than that of high-income countries. Case fatality rate was also significantly greater in low-income countries (India), with a hazard ratio of 2.30 compared with high income countries[30]. Among the different states of India, it is reported in a study that, the prevalence of cardiovascular diseases was high rate in Kerala (in 2016) followed by Punjab, and Tamil Nadu. Besides, various epidemiologic studies have pointed out that there are over 30 million cases of CHD in this country, at present.

A high prevalence of CHD also had been reported during the period of 1960s – 1990s, based on some other epidemiological studies in India. These studies used different criteria to diagnose this condition,[31,32] which include known CHD on treatment/ evidence of previous myocardial infarction with the help of clinical history and/or electrocardiogram [ECG] Q waves), Rose questionnaire positive angina, ST-segment changes, or T-wave changes on ECG.[33] According to this study, a high prevalence of CHD has been reported in the country, varying from 1%-2% in 1960s to 8%-10% in late 1990s.[31] Hence it is more obvious from these reports that CHD prevalence in India has increased 6- to 9-fold over this period, particularly among urban population.

National family health surveys,[34] are nationwide surveys to assess multiple social and health factors. The third national family health survey (NFHS-3) has focused on some non-communicable disease risk factors. As per this survey, more than 190,000 samples were included and they were being checked for their overweight and obesity and further more they were questioned regarding the prevalence of self reported diabetes and CHD. Miniscule rates of known CHD have been reported 67 in 190,000. As well, National statistical survey organization also a population based nationwide representative study focused on multiple social and health parameters. The 60th NSSO survey (conducted in 2004-2005) had given attention to the health status, health care seeking behaviors, health care utilization, and health economics. In this survey, a total number of 390,913 participants were included. Among them, 47,302 rural and 26,566 urban households were surveyed. Based on the hospitalizations for CHD/ confirmed diagnosis using clinical criteria/ ECG changes, and prescription review in this survey were reported in 10% of urban participants and 4% of rural participants, with an average prevalence rate of 6.0%.[35]

III. Factors Contributing High Cvd Mortality In India

There are mainly four factors which contribute to the high CVD mortality in the south Asian region and India.[36] These include

1. Lack of policies related to social determinants of CVD for control of primordial risk factors: smoking, smokeless tobacco, alcohol, physical inactivity, and unhealthy diet.
2. Inadequate preventive measures, poor control of risk factors.
3. Low availability of good quality care and, at times, substandard acute CHD management.
4. Lack of appropriate long-term care of CHD/ CVD patients and absence of cardiovascular rehabilitative and secondary prevention programs.

IV. High Prevalence of Risk Factors of Cad In India

World Health Statistics has reported the prevalence of major CVD risk factors in India. The prevalence of most predominant risk factors, that contribute to CVD burden, which include high systolic BP, ambient air pollution, high level of total cholesterol, high fasting plasma glucose, high BMI have increased across all states of India since 1990. The large INTERHEART study which recruited significant number of Indian subjects found that the conventional risk factors accounted for most of the CHD burden.[37]

The prevalence of high systolic blood pressure, high total cholesterol, and high fasting plasma glucose generally increased across all states of India from 1990 to 2016. Among the risk factors that contributed to disability adjusted life years(DALY) due to cardiovascular diseases in India (2016), the leading ones were dietary risks (56·4%, 95% UI 48·5–63·9), high systolic blood pressure (54·6%, 49·0–59·8), air pollution(31·1%, 29·0–33·4), high total cholesterol (29·4%, 24·3–34·8), tobacco use (18·9, 16·6–21·3), high fasting plasma glucose

(16·7%, 11·4–23·5), and high BMI (14·7%, 8·3–22·0), for both sexes combined.[38]

Among the different states of India, the prevalence of high systolic blood pressure was high rate in Punjab, Himachal Pradesh, Kerala, and Goa whereas the prevalence of high total cholesterol was highest in Kerala, Himachal Pradesh, and Tamil Nadu. The age-standardised prevalence of diabetes mellitus increased in all states of the country from 1990. Similarly the prevalence of high BMI was reported in every state of India from 1990 to 2016.[39] The exposure to ambient air pollution also increased in India to varying degrees in the different states from 1990 to 2016[40-42]. Based on scientific papers, unhealthy lifestyles such as smoking, non-smoked tobacco use, sedentary lifestyles, low consumption of fruits and vegetables, high dietary saturated fat and trans fat intake, and alcohol abuse are also widely prevalent among south Asians when compared to western population.[43]

To be more precise about the high prevalence of risk factors of CAD, India has one of the largest populations of diabetics (over 32 million) with a projected escalation to 57.2 million in 2025. The prevalence of type2 diabetes mellitus in urban Indian adults has been reported to have increased from less than 3.0% in 1970 to about 12.0% in 2000[44]. In addition to that, as per the report of recent surveys by Indian Council of Medical Research (ICMR), estimates the prevalence of diabetes in adults to be 3.8% in rural areas and 11.8% in urban areas. Besides, the number of hypertensive patients is also expected to rise from 118 million in 2000 to 214 million in 2025.[45] About the production and consumption of tobacco products, India is in the third position in the world. Of the 1.1 billion smokers worldwide, 182 million live in India.[46] Moreover, the replacement of a traditional diet rich in fruit and vegetables by a diet rich in calories provided by animal fats and low in complex carbohydrates lead to increased rates of many non-communicable diseases.

The relationship between socio-economic status and coronary heart disease appears to evolve over time as the epidemic of CHD matures. Studies conducted from the 1960s to the early 1990 suggested a direct relationship between income and CHD risk, whereas studies conducted in the last decade have reported an inverse relationship between education and/or income with prevalent or incident CHD[47]. For instance the incidence of CAD has been increased more among rural households when compared to the educated urban people. Further, the risk factors of CAD is highly prevalent among young population when compared to the past, as per the scientific study reports.[48]

All evidence points to the disturbing fact that the country is heading to an epidemic of CHD and its risk factors. Therefore, this increasing burden of cardiovascular diseases and its risk factors need to be addressed urgently.

V. Important Changes In Risk Factor Dynamics In India

A vital change in risk factor dynamics in India is a more rapid increase in CVD risk factors in rural and slum populations compared with city populations.[49,50] Though smoking and non-smoked tobacco are on the decline among more educated urban populations, it continues to increase in rural and less literate populations.[61] Furthermore with rapid advancement in the labor saving technologies, the epidemic of sedentariness has penetrated among rural households.[51] Also the food habits of rural people also had been changed among people living in India. Calorie-dense fast foods are easily available in every part of India in both Indian-style and Western-style. High consumption of fats, saturated fats, trans fats and processed foods are, also, added to the risk.[52] There is an urban-rural convergence in hypertension prevalence in India. Review of hypertension epidemiology studies over the last 2 decades (1995-2015) indicates that even though its prevalence has stabilized at 28%-32% in urban households, in rural populations it has increased from 10%-12% in 1990s to 22%-25% presently. In addition to that, serial NFHS studies have reported a more rapid increase in obesity in Indian rural populations than in urban populations.[53] These are surrogates for increasing abdominal obesity and other cardiometabolic risk factors among the rural populations in India. Mortality due to CVD is significantly greater in rural areas than in the urban as per the prospective urban and rural epidemiological (PURE) study. All of these recent changes has led to a further escalation of CHD epidemic in India.

VI. Significance of Nurses In Promoting Cardiovascular Health

Cardiovascular diseases such as coronary artery disease and heart failure are now major causes of death worldwide. The worldwide personal and societal costs related to diseases of the vascular system are massive. One of the important ways of solving this problem is prevention; therefore, primary prevention is one of the dominating task. International research efforts have focused on discovering ways to implement prevention strategies shown to be both effective and cost-efficient. Nurses are the ideal health care professionals who can perform a cardinal part in the primary prevention as they are spending round the clock with the patients. Many research studies has ensured the role of nurses on cardiovascular disease prevention.

The Preventive Cardiovascular Nurses Association initiated the Global Cardiovascular Nursing Leadership Forum (GCNLF) with the awareness of global burden of cardio vascular diseases and knowing that nurses form the largest healthcare discipline managing CVD risk factors and modifying harmful lifestyle behaviors,

around the world. The mission of the GCNLF is to engage, mobilize, and empower an international community of nurse leaders to promote prevention of CVD around the globe through research, education, policy, and advocacy. From its inception, major focus has been placed on exploring and developing ways in which nurses and global nursing organizations could support the CVD risk reduction goal set by the World Heart Federation (WHF): to reduce non-communicable disease mortality by 25%, which includes CVD mortality, by 2025. The World Health Organization (WHO) and the American Heart Association also support this CVD risk reduction goal and the critical role of nurses and nursing in realizing this goal on a global level.[14-15]

Since 1980s, advanced practice nurses have taken the key role of managing single and multiple risk factors of chronic conditions such as CAD and heart failure through specialized clinics; and programs in primary care, worksites, and cardiac rehabilitation.[54-65] Educational activities, which is provided by the nurses contribute a significant part in the preventive aspects of heart diseases.

A lot of scientific research studies which supports the role of nurses on both prevention and prognosis of cardio vascular diseases.[66] A standard coronary risk intervention project.[68] which is conducted in early 1990s proved that nurse-led risk reduction for patients with history of CVD resulted in angiographically documented regression of disease and a reduction in clinical events. Followed by this study, numerous clinical trials have documented the important and effective role of nurses in improving adherence to guideline-based medical therapies and lifestyle change.[54-59] Likewise, another study among patients of CAD had shown a significant reduction in morbidity and mortality ($p < 0.05$) after a year of their discharge for those who received nurse-directed care compared with usual care.[47] Allen (2010) carried out an analysis of randomized trials between 2000 and 2008. According to this study, he states that research into nursing intervention of cardio-prevention shows a 57% improvement in at least one risk factor. Allen and Dennison.[52] (2010) involved an evaluation of this research and confirmed the positive impact of nursing interventions to prevent cardiovascular diseases.

The survey of 2008 investigated the effectiveness of nurses led programs on preventive care of cardiovascular diseases. An annual controlled trial was conducted in eight European countries: Denmark, France, Italy, Poland, Spain, the Netherlands, Sweden and England. 1189 and 1128 asymptomatic respondents with risk factors were involved.[68] The participants were divided into 2 groups: the first group with usual care and the other group with intervention programme (IP). The groups were compared in terms of risk factors: smoking, consumption of fats, vegetables and fruits, blood pressure and cholesterol. After a year of the intervention programme, the observed values were in favour of the groups that participated in the intervention programme, compared with the control group that received usual care. This programme showed encouraging results, because it reduced the risk factors in the group (IP), unlike the usual care.

Research in Scotland focused on the long-term effectiveness of nursing interventions.[69] The research was conducted among 1343 persons (58% men, mean age 66 years). The first group of 673 people were involved in the intervention and preventive care, where nurses conducted an assessment of lifestyle factors and proposed measures to improve the situation. The second group consisted of 670 patients who received routine care. After the first year of nursing interventions there were no significant differences between the groups, but the results of the analysis after 5 years show a high improvement in the first group that collaborated with nurses. This was proof of the long-term efficacy of these interventions implemented by nurses.

Evident from the research that the most effective strategies for influencing the risk factors in cardio-prevention include team management carried out by specially trained nurses.[70] Several studies have shown that the management of prevention of cardiovascular diseases carried out by nurses is equally effective in achieving its objectives when compared to the preventive measures provided by the physician. This leads to improved outcomes, including the satisfaction and the use of health care services.[71]

Frequent research studies have focused on primary and secondary prevention, adopting a healthy lifestyle is a fundamental point of primary prevention of cardiovascular diseases. Nurses have a major role in strengthening and motivating patients to make changes and to adopt a healthy lifestyle.[72] A good number of studies have shown that the management of secondary preventive care by nurses has led to improved medication compliance, improved compliance with the guidelines of healthy lifestyle and reduced LDL-cholesterol. Positive results have been associated with the educational activities of nurses, repeated inspections and a longer duration of individual counselling with nurses rather than doctors.

VII. Key Concepts Critical To Nurse-Led Case Management

The nurse-led case management approach is characterized by individual goal setting between the patient and nurse to achieve an optimum lifestyle change. Based on the supporting evidences from successful patient case management trials key principles for an effective practice are proposed. The key principles of a nurse led case management approach are given below.[74,76]

1. According to evidence-based guidelines Implement Preventive care for CVD prevention.
2. Preventive care should be focused on those who will benefit the most, that is, patients with vascular disease, those at high risk of developing disease, and the close family members of these patients, and should take into account groups in which the prevalence of CVD and risk factors is highest.
3. Not only the patient but the families of high-risk patients also should be included in preventive efforts.
4. Preventive programs should have an appropriate setting and a flexible approach that allows easy access to the people from the community targeted for the intervention, especially when that community includes vulnerable and deprived groups.
5. The purpose of preventive efforts should be on promoting healthy lifestyle habits to address total cardiovascular risk.
6. Availability of cardio protective medications, and protocols to facilitate the management of BP, lipids, and diabetes and there should be an effective mechanism to prescribe.

CONCLUSION

CVD is now considered as the predominant component of the leading non communicable diseases throughout the world. Epidemiological studies from India indicate that this has become an important public health problem as it directs to a higher number of mortality and morbidity among productive people of the country. Hence it leads to massive economic burden. Unless immediate measures are taken to curb the escalating risk factors, the incidence of CHD will grow beyond control.

As the cornerstone of interventions focused on promoting cardiovascular health and reducing the risk and burden of CVD, current science based recommendations emphasize the development and maintenance of healthy lifestyle behaviors and therapeutic lifestyle change. Many research studies has documented that nurse case management improves cardiovascular risk factors, lifestyle, and, most importantly, outcomes. Equipped with the evidence base in prevention, developmental life course, and behavioral science and the respective skill sets and competencies, nurses will continue to be central and essential in the design and implementation of effective strategies for CVD prevention. Although continuous research is needed, the time is now for an international expansion of nurse-based CVD prevention to reduce death and disability from this worldwide epidemic.

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