

Stroke and Hypertension: Recent Trends of High Blood Pressure and its association with Stroke Mortality



Medical Science

KEYWORDS :

Dr. Brijesh G. Oza	3rd Year, M.D. Medicine, Smt. N.H.L Medical College, Ahmedabad
Dr. Ansh M. Sonagara	3rd Year, M.D. Medicine, Smt. N.H.L Medical College, Ahmedabad
Dr. Kruti R. Rajvansh	3rd Year, M.D. Medicine, Smt. N.H.L Medical College, Ahmedabad
Dr. Jayanti L. Sathavara	2nd Year, M.D. Medicine, Smt. N.H.L Medical College, Ahmedabad
Dr. Prakash H. Chaudhary	2nd Year, M.D. Medicine, Smt. N.H.L Medical College, Ahmedabad

ABSTRACT

High blood pressure has long been recognized as associated with increased risk. Basically, the higher the systolic blood pressure, the greater the risk of stroke. The high blood pressure risks are evident in both genders, all ages and all population. Lower blood pressure are associated with lower stroke risks. These intervention and prevention have been effective in lowering blood pressure and stroke risk reduction.

INTRODUCTION

The diagnosis, treatment, management and prevention of high blood pressure represent one of the major public health issues. Every country and population is affected by elevated BP with adverse outcomes, such as stroke and end-stage renal disease with the associated economic burden. However, the successful efforts for hypertension control and prevention have manifested into a public health success story with global implications.

HYPERTENSION RISKS

Hypertension risks were first recognized with the association of BP levels and stroke risks in the 1920s. Early clinical studies identified clear benefits of lowering BP on reducing stroke deaths. The evidence for the benefits of lower blood pressure is strong, continuous, graded, consistent, independent, predictive, and etiologically significant for those with or without comorbid conditions including coronary heart disease. These results were so significant such to be used in development and implement the national programs, that promoted hypertension screenings and patient treatment.

Hypertension-related outcomes, such as stroke mortality was reduced from 88/100,000 in 1950 to 23/100,000 in 2010, with consistent reductions in mortality for all age, race and sex groups is consistent with high BP recognition and reduction campaigns initiated during the same period. These BP reduction strategies included clinical interventions for hypertension and public health efforts focused on life style for the shifting of BP distributions. The decline in hypertension-related outcomes significantly accelerated after the introduction of tolerable antihypertensive drug therapy in the 1960s.

Epidemiological studies have shown elevated BP is the most important determinant of the risk of stroke with a linear relationship beginning at relatively low levels of systolic and diastolic BP. Risk factors for high BP, including increased body mass, obesity, increased waist circumference, higher alcohol intake, and greater sodium intake are also associated with risks for high BP related outcomes.

PREVALENCE OF HIGH BP AND BLOOD PRESSURE DISTRIBUTION

Recent estimates from population surveillance identify global hypertension prevalence estimates of 1.2 billion individuals, with an estimated 7.0 million deaths per year attributable to hypertension. as the population ages, the number of individuals with elevated BP increases. The percentage of patients with hypertension receiving treatment has increased to where more than 90% of the population knows the relationship between high BP and stroke, nearly 70% of the adult hypertensive population are treated, and nearly half of those treated for high BP are controlled to below 140/90 mm hg.

Between 1980 and 2015 median and 90th percentile systolic BP declined by approximately 16 mm hg. This declining shift in BP distributions was consistent for different age groups, including 18 to 29 years, 18 to 39 years, 30 to 59 years, and 60 to 74 years. These population wide changes in reduced BP seen within the last five decades have been associated with the large accelerated reductions in stroke mortality. The recognition of elevated BP as a risk factor appears to have affected BP levels and subsequent stroke mortality risks. While the decline in stroke mortality and lowering BP may have appeared to be evident before this recognition and treatment of hypertension, the effects of lowered BP is most evident after the population-based campaigns. Hypertension treatment and control rates have consistently increased since the early 1970s. This improvement is seen in all subsets of the population. Further demonstrating the impact of treatment, SBP is lower for treated hypertensive than untreated groups. all populations have shown significant improvements during the time period. Likewise a reduction in mean SBP has been observed for all age, race, and gender groups. The 90th percentile SBP levels have been lowered over the past decades suggesting significant impact of hypertension treatment and control. Similarly, the 10th percentiles have also been lower through past years. The reduction in these lower BP levels is most likely the results of lifestyle and non-pharmacological interventions and public health activities.

Pharmacological treatment of BP focuses on individuals with hypertension defined as a value of 140/90 mm hg or greater, the risk of stroke begins at BP below 140/90 mm

hg levels. A meta-analysis of 60 studies found each incremental rise of 20 mm hg SBP and 10 mm hg DBP was associated with a two-fold increase in death rates from stroke. In addition, age related rise in SBP is primarily responsible for an increase in both incidence and prevalence of hypertension with a lifetime risk of hypertension to be approximately 90% for men and women, who were Non-hypertensive at 55 or 65 years and survived to age 80 to 85. These risks demonstrate the impact of BP to hypertensive categories with increasing age is evident by patterns and trends indicating that the 4-year rates of progression to hypertension are 50% for those 65 years and older with BP in the 130 to 139/85 to 89 mm hg range and 26% for those with BP between 120 and 129/80 to 84 mm hg.

OBSERVATIONAL STUDIES

In cohort studied high BP was identified as responsible for the largest number of cardiovascular and stroke deaths. The INTERSTROKE study concluded the contribution of various risk factors to the burden of stroke worldwide to be 34.6% for hypertension. In addition, approximately 45% of all strokes might be attributed to uncontrolled BP. Such risk estimates are consistent for all components of the population with significant population-attributable risk for elevated BP and stroke mortality. The linear relationship holds true for all demographic indicating the higher BP the greater the risk of stroke mortality.

CLINICAL TRIALS

Treatment of high BP has been associated with reductions in stroke incidence by 35 to 40%; myocardial infarction, 20 to 25%; and heart failure, more than 50%. It is estimated that among patients with stage one hypertension (SBP 140-159 mm hg and/or DBP 90-99 mm hg) reductions of 4.7 mm hg reduced stroke mortality by 17.6%.

Several studies focused on secondary prevention. The Dutch TIA trial study and other major trials have shown significant lower rates of recurrent stroke with lower BP. The secondary prevention of small sub-cortical stroke (SPS3) trial showed targeting a systolic BP less than 130 mm hg is likely to reduce recurrent stroke by about 20% ($p=0.08$) and significantly reduced intra-cerebral hemorrhage by 2/3.

HYPERTENSION TREATMENT GUIDELINES

From the 1970s, high BP guidelines have been developed to guide clinical practice with high impact on elevated BP control and management of high BP. The treatment guidelines have included recommendations focused on the reduction of hypertension-related conditions including stroke. A major contribution of the clinical guidelines remains the definition of hypertension and BP treatment goals. With each set of guidelines, the BP level for treatment and goals have typically been lowered. These guidelines recommendations for clinical management are also used for health hypertension control efforts. The implementation of the guidelines to address the population at risk is designed to impact the disease risk.

STRUCTURED PROGRAMS

The impact of elevated BP on the population has led to the establishment of prevention and management strategies for hypertension as major public health objectives with the premise that if the elevation of BP with age can be prevented or reduced, outcomes, such as stroke will be affected. This concept has led to the implementation of public health strategies and programs to reduce BP in the population as an effort to lower risks. The traditional global risk factors include excess body weight; excess dietary sodium intake;

suboptimal physical activity; inadequate intake of fruits, vegetables, and potassium; and excess alcohol intake. These programs are aimed at working with the food industry and restaurants as well as establishing policies to reduce salt in the prepared and processed food, encouraging the consumption of more fresh fruits and vegetables, increasing community participation in physical activity, detecting and tracking high BP at churches, worksites and community events and public education campaigns.

This population-based approach complements the clinical hypertension treatment and management. Primary prevention strategies are implemented to reduce the BP levels in the population. The desired outcome is the shift to the left of BP distributions in the general population delays in onset of hypertension and BP associated morbidity and mortality. Risk estimates from the two decades ago predicted a 5 mm hg reduction of SBP in the adult population would result in a 14% SBP is consistent with the decline in stroke mortality, and corresponds to the predicted lower stroke mortality rates.

Clinical trials have confirmed the consistent findings of reduced BP and lower stroke mortality rates. The trends in strokes with BP level identified from the observational epidemiologic studies are consistent with the evidence for the levels of BP reduction from clinical guidelines and intervention programs focus on BP management and lower BP levels for primary and secondary prevention. The accelerated decline in stroke mortality beginning in the 1970s is consistent with the aggressive hypertension treatment and control strategies implemented in that time period. In addition, with an aging and heavier population, the pool of at-risk individuals has increased substantially during this time period. The decrease in BP with drug therapy as assessed in clinical settings and widespread public health interventions in the general population appears to be the major determinant for reduction in the risk of hypertension-related outcomes.

REFERENCES

1. Lackland DT, Roccella EJ, Deusch AF, Fornage M, George MG, Howard G, Kissela BM, Kittner SJ, Lichtman JH, Lisabeth LD, et al. Factors influencing the decline in stroke mortality. *Stroke* 2014;45:315-353.
2. O'Donnell MJ, Xavier D, Liu L, Zhang H, Chin SL, Rao-Melacini P, Rangarajan S, Islam S, Paris P, McQueen MJ, et al. Risk factors for ischemic and intracerebral hemorrhagic stroke in 22 countries (the INTERSTROKE study): a case control study. *Lancet* 2013;376:112-123.
3. World health organization. The world health report 2002: Reducing risks, promoting healthy life. Geneva, Switzerland. Available at: <http://www.who.int/whr/2002/>. Accessed on: July 23, 2012.
4. The eighth report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure, *Arch Intern Med* 1997;157:2413-2446.
5. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, Lackland DT, LeFevre ML, Mackenzie TD, Oggedegbe O, et al. Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth joint national committee (JNC 8). *JAMA* 2014;311:507-520.