Epidemiology of Hypertension

Global[11,12]

As per the World Health Statistics 2012, of the estimated 57 million global deaths in 2008, 36 million (63%) were due to noncommunicable diseases (NCDs). The largest proportion of NCD deaths is caused by cardiovascular diseases (48%). In terms of attributable deaths, raised blood pressure is one of the leading behavioral and physiological risk factor to which 13% of global deaths are attributed. Hypertension is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries.

Recent reports indicate that nearly 1 billion adults (more than a quarter of the world's population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025. Earlier reports also suggest that the prevalence of hypertension is rapidly increasing in developing countries and is one of the leading causes of death and disability. While mean blood pressure has decreased in nearly all high-income countries, it has been stable or increasing in most African countries. Today, mean blood pressure remains very high in many African and some European countries. The prevalence of raised blood pressure in 2008 was highest in the WHO African Region at 36.8% (34.0–39.7).

The Global Burden of Diseases; Chronic Disease Risk Factors Collaborating Group has reported 35-year (1980-2005) trends in mean levels of body mass index (BMI), systolic BP and cholesterol in 199 high-income, middle-income and low-income countries. Mean systolic BP declined in high and middle-income countries but increased in low-income countries and is now more than in high-income countries. The India specific data are similar to the overall trends in low-income countries.

National[13-25]

The prevalence of hypertension in the late nineties and early twentieth century varied among different studies in India, ranging from 2-15% in Urban India and 2-8% in Rural India.

The historic studies on the prevalence of hypertension in urban and rural India are depicted in Table 2.

Review of epidemiological studies suggests that the prevalence of hypertension has increased in both urban and rural subjects and presently is 25% in urban adults and 10-15% among rural adults (Table 3).

In a meta-analysis of multiple cardiovascular epidemiological studies, it was reported that prevalence rates of coronary artery disease and stroke have more than trebled in the Indian population. In the INTERHEART and INTERSTROKE study, hypertension accounted for 17.9% and 34.6% of population attributable risk of various cardiovascular risk factors for coronary artery disease and stroke respectively.

As per the Registrar General of India and Million Death Study investigators (2001-2003), CVD was the largest cause of deaths in males (20.3%) as well as females (16.9%) and led to about 2 million deaths annually. Mortality data from CVD in India are also reported by the WHO. The Global Status on Non-Communicable Diseases Report (2011) has reported that there were more than 2.5 million deaths from CVD in India in 2008, two-thirds due to coronary artery disease and one-third to stroke. These estimates are significantly greater than those reported by the Registrar General of India and shows that CVD mortality is

Table 2: Previous Studies (1963 – 1999) on prevalence of hypertension in Urban and Rural Indian population

Author	Place	Year	Age Group (Years)	Hypertension Criteria (mm Hg)	Prevalence			
					Men		Women	
					%	Sample size	%	Sample size
Urban India								
Mathur	Agra	1963	>20	>160/95	3.98	(1408)	6.64	(227)
Malhotra	Railways	1970	20-58	>160/95	6.2[a] 15.2[b]	(2638) (1594)	—	—
Gupta SP	Rohtak	1978	>20	>160/95	6.00	(1151)	7.00	(872)
Dalal PM	Mumbai	1980	>18	Variable	15.63	(3148)	15.38	(2575)
Wasir	New Delhi	1984	20-60	≥160/95	3.80	(1767)	1.45	(688)
Ahmed	Karnataka	1988	>21	DBP >90	10.20	(698)	2.00	(102)
Hussain	Rajasthan	1988	20-60	>140/90	6.15	(1561)	7.33	(1103)
Chaddha	New Delhi	1990	25-64	>160/90	11.66	(637)	13.68	(7351)
Gupta R	Jaipur	1995	≥ 20	>140/90	30.00	(1415)	34.00	(797)
Rural India								
Gupta SP	Haryana	1977	20-69	>160/95	3.50	(1154)	3.69	(891)
Wasir	Delhi	1983	>20	>160/95	3.20	(441)	7.50	(464)
Baldwa	Rajasthan	1984	21-60	>141/91	6.93	(447)	8.81	(465)
Puri	Himalayas	1986	15-82	>160/95	2.44	(1592)	2.38	(1511)
Hussain	Rajasthan	1988	20-60	>140/90	5.72	(1328)	6.43	(1150)
Kumar	Rajasthan	1991	>21	>160/95	4.00	(3742)	3.60	(3098)
Joshi	Maharashtra	1993	>16	>160/95	4.85	(227)	3.17	(221)
Jajoo	Maharashtra	1993	>20	>160/95	2.89	(2247)	4.06	(1798)
Agarwal	Uttar Pradesh	1994	>20	>160/95	1.57	(3760)	—	—
Malhotra	Haryana	1999	16-70	>140/90	3.00	(2559)[#]	5.80	—

[a]North Indians; [b]South Indians; [#]Overall prevalence and total sample size for men and women; *Overall prevalence for men and women

Table 3 : Recent studies (2000 – 2012) on prevalence of hypertension in urban and rural Indian population

First author	Year	Place	Age (yr)	Sample Size	Prevalence (%)
Urban Population					
Anand MP	2000	Mumbai	30-60	1662	34.0
Gupta PC	2004	Mumbai	≥ 35	88653	47.9
Prabhakaran D	2005	Delhi	20-59	2935	30.0
Reddy KS	2006	National	20-69	19973	27.2
Mohan V	2007	Chennai	≥ 20	2350	20.0
Kaur P	2007	Chennai	18-69	2262	27.2
Yadav S	2008	Lucknow	≥ 30	1746	32.2
Rural Populations					
Hazarika	2004	Assam	>30	3180	33.3
Thankappan	2006	Kerala	>30	2159	36
Krishnan A	2008	Harayana	15-64	2828	9.3
Todkar SS	2009	Maharashtra	≥ 20	1297	7.2
Vijaykumar G	2009	Kerala	≥18	1990	36.1
Bhardwaj R	2010	Himachal	≥ 18	1092	35.9
Kinra S	2010	National	20-69	1983	20.0

Table 4 : Top five causes of deaths in India classified according to areas of residence and gender

Rank	India (all age groups)	Rural populations	Urban populations
1	Cardiovascular	Cardiovascular	Cardiovascular
2	COPD, asthma	COPD, asthma	Cancers
3	Diarrhea	Diarrhea	COPD, asthma
4	Perinatal	Perinatal	Tuberculosis
5	Respiratory infections	Respiratory infections	Senility

Adapted from Registrar General of India Report. COPD: Chronic obstructive pulmonary disease.

increasing rapidly in the country. CVD is the largest cause of mortality in all regions of the country. Table 4 shows the top 5 causes of deaths in the rural and urban populations.

There are large regional differences in cardiovascular mortality in India among both men and women. The mortality is highest in south Indian states, eastern and north eastern states and Punjab in both men and women, while mortality is the lowest in the central Indian states of Rajasthan, Uttar Pradesh and Bihar. The prospective phase of the ongoing Million Deaths Study from 2004-2013 shall provide robust data on regional variations and trends in CVD mortality in India.

The prevalence of hypertension in the last six decades has increased from 2% to 25% among urban residents and from 2% to 15% among the rural residents in India. According to Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, the overall prevalence of hypertension in India by 2020 will be 159.46/1000 population.[25]

Various factors might have contributed to this rising trend, attributable to several indicators of economic progress such as increased life expectancy, urbanization and its attendant lifestyle changes including increasing salt intake and the overall epidemiologic transition India is experiencing currently. Another factor that may contribute is the increased awareness and detection.

The prevalence of high normal blood pressure (also called pre hypertension in JNC-VII) has been seen in many recent studies and was found to be around 32% in a recent urban study from Central India. In some studies from South India (Chennai) and from Delhi prevalence of high normal blood pressure has been even higher upto 36% and 44% respectively in these regions. The prevalence of hypertension increases with age in all populations. In a recent urban study it increased from 13.7% in the 3rd decade to 64% in the 6th decade.

In last 2 decades the prevalence of hypertension has been seen to be static in some urban areas. The prevalence of smoking has declined while that of diabetes, metabolic syndrome, hypercholesterolemia and obesity has been increasing.[26,27]

Hypertension awareness, treatment and control status is low, with only half of the urban and a quarter of the rural hypertensive individuals being aware of its presence. It has been seen that only one in five persons is on treatment and less than 5% are controlled. Rural location is an important determinant of poor hypertension awareness, treatment and control. It has been said that in India the rule- of-halves is not valid and only a quarter to a third of subjects are aware of hypertension.

Preventive measures are required so as to reduce obesity, increasing physical activity, decreasing the salt intake of the population and a concerted effort to promote awareness about hypertension and related risk behaviors. Two upcoming studies for identification of regional differences of CVD risk factors in India are the India Heart Watch and PURE studies. PURE[26] is a prospective study localized to five urban and five rural locations while India Heart Watch[27] has centres all over the country. These studies shall further highlight the prevalence and regional variations of hypertension as a CVD risk factor.