

ORIGINAL ARTICLE

ASSOCIATION OF HYPERTENSION AND AGE WITH CORONARY HEART DISEASE: A CROSS-SECTIONAL STUDY FROM DARBHANGA DISTRICT OF BIHAR

Sheela Kumari¹, Bharat Kumar², Vijay Kumar Singh³, H. N. Jha⁴, Kashif Shahnawaz⁵

HOW TO CITE THIS ARTICLE:

Sheela Kumari, Bharat Kumar, Vijay Kumar Singh, H. N. Jha, Kashif Shahnawaz "Association of Hypertension and Age with Coronary Heart Disease: A Cross-Sectional study from Darbhanga District of Bihar". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 60, July 27; Page: 10453-10459, DOI: 10.14260/jemds/2015/1507

ABSTRACT: INTRODUCTION: The epidemic of cardiovascular diseases (Coronary heart disease & stroke) is advancing rapidly in India. Elevation of blood pressure for both men and women increases the risk of coronary heart disease (CHD). **OBJECTIVES:** to study the association between age and hypertension (HTN) with CHD. **MATERIALS & METHODS:** This was a cross-sectional study done among all the fourth grade staffs of Darbhanga Medical College, aged between 20 to 50 years, from Jan. 2015 to Mar. 2015. Study subjects were selected by simple random sampling. Sample size was estimated to be 642. **Observation:** It was observed that 39.68% of the total study population was found to be hypertensive, among which 39.89% of the population were males and 25% were females. The association between HTN and CHD in the present study was found to be statistically very highly significant ($p < 0.001$). It was also observed in that maximum prevalence of HTN (70.59%) among the study subject was in the age group of 50-59 years and the overall prevalence of HTN among the study population was found to be 39.67%. The association of the prevalence of CHD with the increase in age was found to be statistically significant ($p < 0.001$). **CONCLUSION:** It was concluded from our study that the overall prevalence of CHD was 5.16% and the maximum prevalence of CHD was found in the age group of 50-59 years. A positive association was observed between advancement of age and increased prevalence of CHD. Also, a significant association between HTN and the prevalence of CHD was observed. **RECOMMENDATIONS:** Periodic screening of diseases like HTN, diabetes mellitus, obesity, dyslipidemia, etc. should be done with age. Persons having sedentary life-styles should be encouraged to undergo regular physical exercises.

KEYWORDS: Age, coronary heart disease (CHD), Hypertension (HTN).

INTRODUCTION: The mortality transition in developed countries involved a shift in the major causes of death from communicable disease such as measles, influenza and small pox, to chronic and degenerative diseases such as heart disease, cancer and lung diseases. In the developing countries, increase in the life expectancy, higher incomes and higher standard of living associated with economic development are likely to place increasing percentages of people at risk of developing the 'lifestyle' diseases now common in industrialized countries.

It has been estimated that 5.3 million deaths attributable to cardiovascular disease occurred in the developed countries in 1990, whereas the corresponding figure for the developing countries ranged between 8-9 million (i.e., a relative excess of 70%) [Lopez AD et al].¹ In 1993 it was estimated that mortality from cardiovascular diseases was 30% in china, 10% in India, 20-45% in Eastern Mediterranean, 25% in Latin America and 15-20% in sub-Saharan Africa. On the whole mortality from these diseases is increasing rapidly, while general mortality is decreasing.

ORIGINAL ARTICLE

Because of social and economic difficulties and scarcities of doctors there are often long delays before cardiovascular diseases are diagnosed in developing countries (Epstein F H).² The epidemic of cardiovascular diseases (coronary heart disease and stroke) in India is advancing rapidly (Reddy & Yusuf S).³ India is experiencing an epidemiological health transition characterized by rapid decline in nutritional and parasitic diseases (Pre-transitional diseases), with an alarming rise in cardiovascular diseases, mainly coronary heart diseases and stroke (post-transitional diseases).³

There has been a dramatic rise in the prevalence of coronary artery disease from 3.5% in 1960s to 11% in late 1990s in urban India and it is projected to rise substantially in future (Gupta et al).⁴ Indians have the highest risk of coronary heart disease (CHD) among all the major ethnic groups across the globe. CHD prevalence has shown a significant increase in India. Since the 1950s the increase is significantly more in urban subjects than in the rural, as also in other parts of Asia. Prevalence of CHD in Indians has been reported from various studies as ranging from 10 per 1000 to 26 per 1000 (Gupta R et al).⁵

Elevation of either the systolic or diastolic blood pressure for both men and women increases the risk of developing CHD (Kannel WB).⁶ According to the recommendations of the WHO Expert Committee on Arterial Hypertension, the cut-off values of the prevalence classes of blood pressure are as follows (WHO TRS 628).

For Systolic Blood Pressure:

Normal	: <140 mm Hg
Borderline	: 140-159 mm Hg
High	: ≥160 mm Hg

For Diastolic Blood Pressure:

Normal	: < 90 mm Hg
Borderline	: 90-94 mm Hg
High	: ≥95 mm Hg

Elevated blood pressure is a powerful risk factor for atherosclerotic disease, in the instance for both premature coronary and cerebrovascular diseases.

MATERIALS AND METHODS: The present study was a cross-sectional study, carried out under the department of physiology, Darbhanga Medical College & Hospital, Laheriasarai, Darbhanga, to study the association between coronary heart disease and hypertension. Population under study were all the fourth grade staffs of Darbhanga Medical College, aged 20 to 50 years.

Study period was from Jan-2015 to Mar-2015 (3 months). Study subjects were selected by simple random sampling and enrolled for the study. The sample size was calculated by using the formula (For finite population)-

$$n = \frac{4pq}{L^2 + \frac{4pq}{N}}$$

ORIGINAL ARTICLE

Where,

n = sample size.

p = positive character.

q = 1-p.

L = allowable error (usually 10%-20% of "p").

N = population size, i.e 1300 (total number of fourth grade staffs in Darbhanga Medical College).

Considering the "p" (Prevalence of coronary heart disease) value of 7.3% in India and taking L=20% of "p" the sample size was estimated to be 642.

A pre-designed and pre-tested questionnaire was used for collecting data. The blood pressure was measured in the right arm of the subjects (After taking a rest of 5 minutes before measurements) using a standard mercury manometer. The fifth phase of the korotkoff sounds was recorded as the diastolic pressure. Hypertension was diagnosed if there was a current or past treatment for hypertension or on the basis of threshold values of 140 mmHg systolic blood pressure (SBP) and 90 mmHg diastolic blood pressures (DBP) [Reddy K S⁷; WHO TRS 862].⁸

OBSERVATION: The present study was conducted amongst the fourth grade staffs of Darbhanga Medical College & Hospital of Darbhanga district under the department of physiology in collaboration with the department of community medicine.

In our present study, the estimated sample size was 642, which represents almost the half of the total population, but due to non-respondent only 562 personnel could be studied.

Age in years	Male	Percentage	Female	Percentage	Total Number (%)
	Number		Number		
20-<30	166	100	0	0	166(29.54)
30-<40	175	96.67	6	3.31	181(32.21)
40-<50	162	98.78	2	1.22	164(29.18)
50-59	51	100	0	0	51(9.07)
Total	554	98.58	8	1.42	562(100)

Table 1: Age and sex distribution of the study population

Above table shows that:

- (i) The percentage of male staff personnel enrolled for the study was 98.58% and females were 1.22%.
- (ii) Majority of the respondents were in the age group of 30-<40 yrs.

Blood Pressure	Male No. (%)	Female No. (%)	Total No. (%)
Normotensive (BP<140/90 mmHg)	333(60.11)	6(75.00)	339(60.32)
Hypertensive (BP ≥ 140/90 mm Hg)	221(39.89)	2(25.00)	223(39.68)
Total	554(100.00)	8(100.00)	562(100.00)

Table 2: Gender wise record of blood pressure amongst the study population

ORIGINAL ARTICLE

It was observed from the above table that:

1. 39.68% of the total study population was found to be hypertensive.
2. 39.89% of the males were found to be hypertensive.
3. 25% of the females were found to be hypertensive
4. The association of hypertension and CHD in the present study was found to be statistically very highly significant ($p < 0.001$).

Blood Pressure	Age in years				Total No. (%)
	20-<30 No. (%)	30-<40 No. (%)	40-<50 No. (%)	50-59 No. (%)	
Normotensive (BP<140/90mmHg)	149 (89.76)	103 (56.91)	72 (43.90)	15 (29.41)	339 (60.33)
Hypertensive (BP≥140/90mmHg)	17 (10.24)	78 (43.09)	92 (56.10)	36 (70.59)	223 (39.67)
Total	166 (100)	181 (100)	164 (100)	51 (100)	562 (100)

Table 3: Age wise record of blood pressure among the study population

Above table shows that:

1. Maximum prevalence of hypertension (70.59%) amongst the study subjects was in the age group of 50-59 yrs.
2. 56.10% of the study subjects who had hypertension were in the age group of 40-<50 yrs.
3. Minimum prevalence of hypertension (10.24%) were found among the age group of 20-<30 yrs.
4. Overall prevalence of hypertension among the study population was found to be 39.67%.

Age Group in Years	No. of Personnel (Study Population)	No. of Personnel with CHD	Prevalence (%)
20-<30	166	0	0
30-<40	181	2	3.56
40-<50	164	11	19.57
50-59	51	16	28.47
Total	562	29	5.16

Table 4: Prevalence of coronary heart disease (CHD) among the study population

From the above table it was observed that:

1. The prevalence of CHD was 5.16%.
2. Maximum number of CHD was found in the age group of 50-59 yrs.
3. Minimum number of CHD was found in the age group of <30 yrs.
4. The association of the prevalence of CHD with the increase in age was found to be statistically significant ($p < 0.001$).

ORIGINAL ARTICLE

A significant association was observed between advancement of age (above the 40 yrs of age) and prevalence of CHD. Odd's ratio was 7.50 (95% CI: 1.39-40.04 & $p < 0.05$) for the age group of 40- <50 yrs and 51.28 (95% CI: 9.39-281.46 & $p < 0.001$) for the age group of 50-59 yrs.

The association between family history of hypertension and prevalence of CHD was found to be statistically significant ($p < 0.001$). The odd's ratio was 5.72 (95% CI: 2.41-13.46) for the subjects having family history of hypertension in comparison to the persons with no positive family history of hypertension.

The risk of developing CHD was 18.90 times (95% CI: 5.16-69.40) more for the subjects having hypertension than for those having normal blood pressure. There was a significant association between hypertension and CHD ($p < 0.001$).

DISCUSSION: The present study was conducted in 562 fourth grade staffs of Darbhanga Medical College & Hospital, Darbhanga in the age group of 20-59 yrs. detailed information on the demographic characteristics of the staffs, clinical examination, including history of present illness, past history, personal history information regarding various risk factors was obtained and recorded in pre-designed standard proforma. During the one year study period all the 562 staffs were interviewed, examined and assessed for any illness and all the necessary information and data required for the study were collected.

In our present study, the age-wise distribution of the study subjects were as follows- 30-<40 yrs. (32.21%), 20-<30 yrs. (29.54%) and in the age group 40-<50 yrs. (29.18%). A significant association was observed ($p < 0.001$) between prevalence of CHD with advancement of age. Rastogi P et al⁹ reported 44.23% of respondents were from age group of 28-37 yrs., 32.30% were from age group 38-47 yrs. and 17.70 were from age group 48-58 yrs. Findings of our present study were almost similar with the findings observed by Rastogi P et al.⁹ Pinto V G et al.¹⁰ also reported 35.04% of respondents were from the age group of 40-49 yrs, 32.35% were from the age group of 50-59 yrs.

In the present study, 554 (98.58%) staffs were male who constituted the majority of study population, whereas 08(1.42%) were females. Rastogi P et al⁹ reported from a study conducted among Nagpur police personnel regarding risk factors and prevalence of CHD that all the study subjects of sample size 493 were males. The present study findings were almost similar with the findings observed by Rastogi P et al.⁹

Hypertension is one of the established risk factors in CHD [as reported by Wander et al.¹¹ & Paris et al.¹²]. In this study, the overall prevalence of hypertension was 39.68%. Amongst males the prevalence of hypertension was 39.89% and amongst females it was 25%.

The association of hypertension with the prevalence of CHD in the present study was found to be very highly significant ($p < 0.001$). Gupta R et al.¹³ reported that the prevalence of hypertension in Jaipur was 36.4% among males and 37.5% among females. Joseph A et al.¹⁴ reported that prevalence of hypertension in Trivandram was 31.0% among males and 41.2% among females. Gupta P C et al.¹⁵ reported that prevalence of hypertension in Mumbai was 43.8% among males and 44.5% among females. Gupta R et al.¹⁶ reported that prevalence of hypertension in Rajasthan was 23.7% among males and 16.9% among females. Rastogi P et al.⁹ reported that the prevalence of hypertension among Nagpur police personnel was 22.50%. The findings of all these studies are almost similar and also consistent with our present study.

In this study, the overall prevalence of hypertension was 39.67%. Maximum prevalence of hypertension was observed among the subjects aged 50-59 yrs (70.59%) and minimum was in the

ORIGINAL ARTICLE

age group of 20-<30 yrs (10.24%). Among the age group of 40-<50 yrs the prevalence of hypertension was also substantially high (56.10%). Rastogi P et al⁹ observed that the maximum prevalence of hypertension was among the age group of 48-58 yrs (37%) and minimum was among the age group of 18-37 yrs (13.10%). Among the age group 38-47 yrs the prevalence of hypertension was also substantially high (37.00%). The findings of our present study are similar with the study of Rastogi P et al.⁹

CONCLUSION: Conclusions of our present study are:

1. The overall prevalence of CHD in the present study was 5.16% and the maximum prevalence of CHD was found in the age group of 50-59 yrs.
2. A positive association was observed between advancement of age and increased prevalence of CHD ($p<0.001$).
3. Hypertension was present in 39.68% of the study subjects and maximum prevalence of hypertension was present in the age group of 50-59yrs with an increasing trend with advancement of age.
4. A significant association between hypertension and the prevalence of CHD was observed ($p<0.001$).

RECOMMENDATIONS:

1. Practices like consumption of alcohol and tobacco in any form should be avoided. As these practices are known risk factors of CHD, the stoppage of such harmful practices will help to reduce the incidence of CHD among the study population.
2. Periodic screening of diseases like hypertension, diabetes mellitus, obesity, hypercholesterolemia and hypertriglyceridemia should be done.
3. Staffs persuing sedentary life style should be encouraged to undergo regular physical exercises.

REFERENCES:

1. Lopez A D, Murray C J L: Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet* 1997; 349: 1269-1276.
2. Epstein F H. Public health implications of the Seven Countries Study. In: Kromhout D, Menotti A, Blackburn H, eds. *The Seven Countries Study: A Scientific Adventure in Cardiovascular Disease Epidemiology*. Utrecht, Netherlands: Brouwer Offset bv; 1994: 169-174.
3. Reddy, Yusuf S. Emerging epidemic of cardiovascular disease in developing countries. *Circulation*; 1998; 97: 596-601.
4. Gupta A, Gupta R, Sarna M, Rastogi S, Gupta V P, Kothari K. Prevalance of diabetes, impaired fasting glucose & insulin resistance syndrome in an urban Indian population. *Diabetes Res Clin Pract*. 2003; 61(1): 69-77.
5. Gupta R, Prakash H, Gupta V P, Gupta K D. Prevalance and determinants of coronary heart disease in a rural population of India. *Jour Clinical Epidemiology*. 1997; 50: 203-209.
6. Kannel W B. Some lesson in cardiovascular epidemiology from Framingham. *Am J Cardiol*, 1976; 37: 269-82.
7. Reddy K S. Why is preventive cardiology essential in the Indian context? In: Wasir H S Editor. *Preventive Cardiology: An Introduction*. New Delhi; Vikas Publishing; 1993; 1-14.

ORIGINAL ARTICLE

8. WHO: Scientific Technical Report Series, 1996; No. 862.
9. Rastogi P, Mathur B, Rastogi S, Gupta V P, Gupta R. Influence of traditional Indian cooking habits on fatty acid composition of commonly used fats. *Indian Heart Jour*, 2002; 54: 510.
10. Pinto V G, Motghar DD, Ferreira A M A, Kurkarni M S. Prevalance of Coronary Heart Disease in an urban community of Goa. *South Asian J Preventive Cardiol*; 2004.
11. Wander G S, Khurana S B, Gulati R, et al. Epidemiology of coronary heart disease in a rural Punjab population: prevalence and correlation with various risk factors. *Indian Heart Journal*, 1994; 46: 319-323.
12. Paris P, Pogue J, Gerstein H, et al. Risk factors for acute myocardial infarction in Indians: a case-control study. *Lancet* 1996; 348: 358-363.
13. Gupta R, Gupta V P, Sarna M, et al. Prevalence of coronary heart disease and risk factors in an Indian urban population: Jaipur Heart Watch-2. *Indian Heart Jour* 2002; 54: 59-66.
14. Joseph A, Kutty V R, Soman C R. High risk for coronary heart disease in Thiruvananthapuram City: a study of serum lipids and other risk factors. *Indian Heart Jour*, 2000; 52: 29-35.
15. Gupta P C, Gupta R. Hypertension prevalence and blood pressure trends among 99,589 subjects in Mumbai, India. Abstract. *Indian Heart Jour*, 1999; 51: 691.
16. Gupta R, Sharma A K. Prevalence of hypertension and sub-types in an Indian rural population. Clinical and electrocardiographic correlates. *Jour Human Hypertension*, 1994; 8: 823-829.

AUTHORS:

1. Sheela Kumari
2. Bharat Kumar
3. Vijay Kumar Singh
4. H. N. Jha
5. Kashif Shahnawaz

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Physiology, Darbhanga Medical College and Hospital, Bihar.
2. Assistant Professor, Department of Physiology, Darbhanga Medical College and Hospital, Bihar.
3. Assistant Professor, Department of Physiology, Darbhanga Medical College and Hospital, Bihar.

FINANCIAL OR OTHER

COMPETING INTERESTS: None

4. Professor and HOD, Department of Physiology, Darbhanga Medical College and Hospital, Bihar.
5. Assistant Professor, Department of Community Medicine, MGM Medical College and LSK Hospital, Kishanganj, Bihar.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Kashif Shahnawaz,
Manhar Road,
Chhoti Quazipura District,
Darbhanga-846004,
Bihar, India.
Email: kashif.shahnawaz98@gmail.com

Date of Submission: 06/07/2015.
Date of Peer Review: 07/07/2015.
Date of Acceptance: 21/07/2015.
Date of Publishing: 24/07/2015.