

Association of Hypertension with Body Mass Index

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Abstract:

Background: Body mass index (BMI) is positively associated with blood pressure (BP). Weight loss significantly reduces blood pressure (BP). The principal aim was to find out the association of Body Mass Index (BMI) with hypertension. **Methods:** This cross-sectional study was conducted at outpatient department of Bangabandhu Sheikh Mujib Medical University (BSMMU). A total of 1128 hypertensive patients were included in this study by purposive sampling method. Staging of hypertension was done according to The JNC 7 Hypertension Guidelines. BMI was calculated by measuring weight in kilograms divided by height in meters squared. **Results:** This study demonstrated that majority (58.1%) were within 40 to 60 years. 63.7% patients were male and 36.3% were female. Maximum observed systolic blood pressure was 170 mm of Hg and minimum 110 mm of Hg. Maximum diastolic blood pressure was 120 mm of Hg and minimum 60 mm of Hg. Out of 1128 hypertensive patients' 21% patients had normal BMI, 66.7% overweight, 8.8% obese and 3.5% patients were under weight. So hypertension was found more in overweight study subjects which was found statistically significant. **Conclusion:** The prevalence of hypertension is more in increased BMI.

Keywords: Hypertension, Body weight, BMI etc.

Introduction:

Body mass index (BMI) is positively associated with blood pressure (BP); this association has critical implications for countries like China, where hypertension is highly prevalent and obesity is increasing¹. Weight loss significantly reduces blood pressure (BP), suggesting that BMI is not merely a marker of factors associated with high BP but is causally associated²⁻⁴. Hypertension has proven to be a silent killer contributing to many deaths and considerably increasing morbidity Worldwide⁵.

Hypertension is rapidly emerging as a major public health problem in developing countries⁶. 25% of world adult population is already hypertensive. Almost three quarters of the hypertensive population are in developing countries⁷. Nationwide survey on NCD conducted in Bangladesh in 2010 indicated that the prevalence of hypertension is 17.9%⁸. Twelve million people suffers from hypertension in Bangladesh⁹. So this association

might help in the prevention of hypertension and thereby prevent target organ damage.

Methods:

This cross-sectional study was conducted at outpatient department of Bangabandhu Sheikh Mujib Medical University from January, 2017 to December, 2017. A total of 1128 patients were included in this study by purposive sampling method. All the patients were diagnosed cases of hypertension (BP >140/90 mm of Hg). This study included adult patient aged ≥18 years. Blood pressure was measured with a well-calibrated sphygmomanometer.

Staging of hypertension was done according to The Seventh Report of the Joint National Committee on Prevention, detection, Evaluation and treatment of High Blood Pressure. Body mass index (BMI) of all hypertensive patients was then calculated as weight in kilograms divided by height in meters squared. In addition to physical measurements,

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socio-demographic data and data on basic medical history were collected from standardized in-person interviews by trained medical staff.

Results:

This study intended to find the association between hypertension and BMI. The findings derived from data analyses were presented below.

In this study, out of 1128 hypertensive patients majority 655 (58.1%) were between 40-60 year of age and about 718 (63.7%) were male and 410 (36.3%) were female with significant association (p<0.001). (Table-I).

Socio-demographic data demonstrated that educational status of the study subjects included majority 314 (27.8%) were graduate with significant

association (p<0.001) and Occupation comprised majority were Service holder 548 (48.6%) with significant association (p<0.001). Most 733 (65%) patients were from rural areas and the rest (35%) was from urban areas with significant association (p<0.001). Majority of the study patients 851(75.4%) had no family history of hypertension with insignificant association (p=0.63).(Table-II).

Our analysis includes 1128 participants all were hypertensive. Among the study subjects, 715 participants (66.7%) were overweight (BMI 25.0-29.9) with significant association (p=0.002), and 128 participants (10.3%) were obese (BMI≥30) with significant association (p<0.001), as defined by the World Health Organization international classification^{15,10}. Majority 715 (66.7%) patients were overweight. (Table-III).

Table-I
Distribution of age and sex of the study subjects (n = 1128)

Age (years)	Sex		Total
	Male	Female	
18-40	315 (27.92%)	140 (12.41%)	455 (40.3%)
40-60	385 (34.13%)	270 (23.93%)	655 (58.1%)
> 60	18 (1.6%)	00 (00%)	18 (1.6%)
Total	718 (63.7%)	410 (36.3%)	1128 (100%)

Table-II
Socio-demographic characteristics of the study subjects (n = 1128)

Variables		Sex		Total
		Male	Female	
Educational Qualification	Primary	207	63	270 (23.9%)
	Secondary	87	175	262 (23.2%)
	Higher Secondary	81	24	105 (9.3%)
	Graduate	286	28	314 (27.8%)
	Postgraduate	57	120	177 (15.7%)
Total		718	410	1128 (100%)
Occupation	Farmer	138	00	138 (12.2%)
	Service	428	120	548 (48.6%)
	Businessman	152	00	152 (13.5%)
	Others	00	290	290 (25.7%)
Total		718	410	1128 (100%)
Residence	Rural	195	200	395 (35%)
	Urban	523	210	733 (65%)
Total		718	410	1128 (100%)
Family history HTN	Yes	100	53	153 (13.56%)
	No	618	357	975 (86.44%)
Total		718	410	1128 (100%)

Table-III
BMI of the study subjects (n = 1128)

Variables	Sex		Total	
	Male	Female		
BMI	Normal	163	73	236 (20%)
	Overweight	466	249	715 (66.7%)
	Obese	48	80	128 (10.3%)
	Under weight	41	08	49 (3.5%)
Total	718	410	1128 (100%)	

Discussion:

This study describes the association between BMI and BP which was conducted in tertiary care hospital of Bangladesh. In this study among 1128 hypertensive patients majority (58.1%) were 40 to 60 years of age and 63.7% were male and 36.3% female with Male female ratio 1.75:1.

Hypertension is more common in men than in women of same age. Sex difference in the prevalence of hypertension may be mainly attributed to the differences in dietary habit, life style choice, salt intake, Physical activity level and some genetic polymorphism¹¹.

Among 1128 hypertensive patients only 13.56% patients had positive family history and majority (75.4%) patients had no family history of hypertension. Positive family history is associated with hypertension prevalence double that found in patients with negative history and is independent with weight. When over weight is also present, however hypertension prevalence is three to four times as high¹².

BMI status of the study subjects found that majority 66.7% were overweight. The findings of this study is consistent with a study conducted in china, which also showed that the association of BMI with SBP and DBP was consistently positive across 86 subgroups defined by socio-demographic variables and was nearly linear, with little variation in its shape¹.

Conclusion:

The prevalence of hypertension is more in increased BMI. The limitation of the present study is data were collected from single center. Further

multi-center study was recommended to validate the finding of the present study.

References:

1. George C. Linderman, BS; Jiapeng Lu, PhD; Yuan Lu, ScD; Xin Sun, MS; Wei Xu, MS; et al. JAMA Network Open.2018; 1(4):e181271. doi:10.1001/jamanetworkopen.2018.71.
2. Rahmouni K, Correia ML, Haynes WG, Mark AL. Obesity-associated hypertension: new insights into mechanisms. Hypertension. 2005; 45(1):9-14. doi:10.1161/01.HYP. 0000151325.83008.b4
3. Rahmouni K. Obesity-associated hypertension: recent progress in deciphering the pathogenesis. Hypertension.2014;64(2):215-221. doi:10.1161/HYPERTENSIONAHA.114.00920
4. Sowers JR. Obesity as a cardiovascular risk factor. Am J Med. 2003; 115(suppl 8A):37S-41S. doi:10.1016/j.amjmed.2003.08.012
5. Kotchen TA, Hypertensive Vascular Disease; In: Longo DL, Fauci SA, Kasper DL, Hauser SL, Jameson JL, Loscalzo J. Harrison's Principles of Internal Medicine ,18th edition. New York: McGrawHill publishers, 2012. Voll; 2042-59.
6. Hypertension Study Group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: A multicentre study. Bull World Health Organ. 2001; 79:490-500.
7. Kearny PM, Global burden of Hypertension: analysis of worldwide data. Lancet 2005; 365:217-23.

8. Rahman M, Chowdhury MAJ et al. NCD Risk Factor Survey. BSM 2010; 1- 35.
9. Sultana M H. Non-adherence to drug treatment in patients of essential hypertension. BMRC Bull; 2009; 35: 76-78.
10. Consultation WHOE; WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004; 363(9403):157-163. doi:10.1016/S0140-6736(03)15268-3
11. Ruixin Y, Jinzhen W, Shangling P, Weixiong L, Dezhai Y, Yuming C. Sex differences in environmental and genetic factors for hypertension. The American journal of medicine 2008;121(9):811-819.
12. Stamler R, Stamler J, Reidlinger WF, Algera G, Roberts RH. Family (Parental) history and prevalence of hypertension. JAMA 1979;241(1):43-46.