Original Research Article

Association of waist and hip circumferences and BMI with essential hypertension in young

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Abstract

Obesity is one of the most important risk factor for cardiovascular diseases (CVD) which includes hypertension. Essential Hypertension itself is a risk factor for CVD. Waist circumference (W.C.), waist to hip (W/H) ratio are more sensitive indicator than body mass index (BMI) in determining the risk of developing essential hypertension in young population in our vicinity which in turn increases the risk of CVD. We are determining what indicator is most sensitive risk factor for hypertension in young population coming to tertiary care centre in our vicinity.

Key Words: Body Mass Indec (BMI), Cardiovascular diseases (CVD), Hypertension (HTN), Obesity.

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INTRODUCTION

Hypertension is a common health problem in developed countries and its prevalence is probably increasing in nations of the developing world. Also known as the "silent killer", it may exist for prolonged periods in the individual without symptoms and may manifest only after causing serious irreversible pathology and complications. Hypertension has a proven association with high mortality and morbidity from cardiovascular, cerebrovascular and renal diseases. Its control will significantly lower these diseases[1]. High blood pressure is an established risk factor for cardiovascular disease. Furthermore, high blood pressure contributes substantially to cardiovascular disease incidence and premature mortality. Cardiovascular disease events occur most frequently during or after the fifth decade of life but pathophysiological and epidemiological evidence suggests that essential hypertension and the precursors of cardiovascular disease originate in childhood[2]. Hypertension is a growing health problem in Asia. There is a paucity of data on hypertension in teenagers and young adults, as they are deemed to be at lower risk of developing the disease. With a growing problem of hypertension worldwide, there is a concern that hypertension in young adults may also be on the rise and that cases are not detected because of inadequate screening at this age group. While the prevalence of hypertension is relatively low in young adults, it nevertheless constitutes an important problem, as target organ damage is correlated with duration of disease and early detection and management of hypertension may confer reduction in long-term risks of cardiovascular disease[4]. Hypertension occurring in teenagers and young adults is uncommon. Though the most common form is still essential hypertension, secondary causes are more commonly found in this subject than in older adults. Renal, cardiovascular and endocrine diseases constitute most of these causes. Coarctation of the aorta is the most common cardiovascular cause of hypertension in young, and its importance lies in the fact that it is correctable, and that its persistence often leads to dangerous complications and early death[4]. Patients with hypertension have some underlying mechanism that

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elevates their blood pressure. Conceptually, it is useful to think of patients with hypertension as having either essential hypertension (systemic hypertension of unknown cause) or secondary hypertension (hypertension that results from an underlying, identifiable, often correctable cause). Although only about 5 to 10 percent of hypertension cases are thought to result from secondary causes; hypertension is so common that secondary hypertension probably will be encountered by the primary care practitioner[7]. Various analysis have indicated that the concurrent increase in Body Mass Index was responsible for most of but not all the increase in prevalence of hypertension. The epidemic of childhood and adolescent obesity, the risk of developing left ventricular, hypertrophy and evidence of early development of atherosclerosis would make detection and intervention in young adult with hypertension is important to reduce long term health risk. However, the supporting data from Indian prospective are lacking. With the prevalence of overweight children and adolescents increased now a days, blood pressure has also increased over the past decade among children and adolescents[2]. Young onset hypertension being an emerging health problem, needs to be studied in depth. The importance of detecting hypertension at an early age will be benefited in pointing out the etiology, assessing associated risk factors, preventing end organ damage and reducing long term cardiovascular risk. There are very few studies on this subject worldwide. Present study is planned to study epidemiology of hypertension in young adults, and the various risk factors associated with it. Thus, giving insight into magnitude of hypertension problem in young adults.

MATERIALS AND METHODS

- This is an observational study.
- Patients coming to tertiary care center either getting admitted or coming to outpatient department for high blood pressure or for different reason and incidentally found to have high blood pressure were assessed according to inclusion and exclusion criteria.

Inclusion Criteria

1. Patient's age group > 12 years and< 40 years.
2. Patients with diagnosis of hypertension but not having obvious diagnosed or suspected secondary form of hypertension.

Exclusion Criteria

1. Patient's age group < 12 years and> 40 years.
2. Pregnant females.
3. Patients diagnosed or suspected as secondary hypertension.

Blood Pressure Measurement

- Measurements begin after the subject had rested for five minutes.
- Had avoided smoking and intake of caffeine during the last half an hour.
- The patients should seated in a comfortable chair with their backs supported and arms bared and supported at heart level.
- The center of the cuff placed at heart level.
- The cuff was selected such as the width of the bladder cuff should equal at least 40% of the arm circumference and the length of the cuff bladder should encircle at least 80% of the arm length.
- Standard bladder measured 12 - 13 cm X 35 cm and we inflated the cuff to 30 mm of Hg above pulse occlusion.
- Attention was paid to cuff placement, stethoscope placement, and the rate of deflation of the cuff (2mmHg/s).
- Systolic blood pressure is the first of at least two regular "tapping" Korotkoff sounds (Phase 1).
- Diastolic blood pressure is the point at which the last regular Korotkoff sound (Phase 5) is heard.
- Individuals with systolic pressure > / = 140 /90 mmHg,
- Had repeat measurements by the same medical personnel using the same mercury sphygmomanometer after a 5-minute rest.
- The mean of two readings, recorded two minutes apart was taken, if these readings differed by more than 5 mmHg, further three readings were recorded at 2-minute intervals and the mean of all five readings was taken.
- We used calibrated mercury sphygmomanometers.
- Blood pressure was measured in all four limbs by standard technique.

Anthropometrical Measurements

- Anthropometrical measurements were taken using standard apparatus with subjects were lightly clothed and wearing no shoes or restrictive underwear.
- Weight was measured in the upright position with a weighting scale in kilogram (kg).
- Height was measured in cm.
- All measurements were taken using a non-stretching tape.
- Body Mass Index (BMI) was calculated as weight (kg) divided by height squared (m^2) to estimate overall body fat distribution.

- The World Health Organization (WHO) had shown a simplistic relationship between BMI (body mass index) and the risk of comorbidity.
- A normal range of BMI was considered between 18.5 to 24.9 kg/m^2.
- Waist circumference (WC) was measured around the smallest circumference between the lowest rib and iliac crest or midway between the lowest rib and iliac crest for obese subjects with no natural waist.
- The measurement was taken at the end of the normal respiration while the subject was standingerect with his arms at his side and feet together.
- Hip circumference was measured horizontally at the level of the greatest lateral extension of the hips.
- All circumferences were measured by using an inelastic tape without compressing the skin
- BMI, WC, Waist to Hip Ratio (W/HR) were used in the present study for two reasons:-First, due to simplicity and reproducibility of height, weight, hip and waist circumferences measurements and second because both have been recognized as important indicators for estimating cardiovascular disease risk factors in particular their positive association with hypertension.
- The revised guidelines categorize overweight as a BMI derived from booking weight (kilograms) and height (metres). Using this, the patients were categorized as underweight (<18.5 kg/m^2), normal or lean BMI (18.5–22.9 kg/m^2), overweight (23.0 –24.9 kg/m^2) and obese (≥25 kg/m^2) based on the revised consensus guidelines for India. 23.0 – 24.9 and obesity as a BMI≥25.
- Normal cutoff values for BMI is 23 kg/m^2 for both sexes. Cutoff values for WC were 85 and 80 cm for men and women, respectively; the corresponding WHRs were 0.88 and 0.81, respectively. Optimum sensitivity and specificity obtained from the receiver operator characteristic curve corresponded to these cutoff values.
- The WHO also advocated a lower limit of normal BMI in Asian Indians. The proposed classification for adult BMI was 23 kg/m^2, and for obesity it was >25 kg/m^2. The cutoff levels for WC have also been lower for the proposed criteria.
- The cutoff values derived for WC and WHR were also lower than those suggested in earlier studies. Use of WC as an index of upper-body adiposity appeared to be more sensitive than WHR, as shown by the interactions between WC and BMI in either sex.
- In summary, the healthy BMI for an urban Indian is <23 kg/m^2, and cutoff values for WC were 85 cm for men and 80 cm for women, and for WHR they were 0.89 for men and 0.81 for women. It may be appropriate to use WC as an index for upper-body adiposity.
- Cut off values:
- W.C. - 80 cm- women
- - 85 cm – men
- W / H Ratio - 0.81 cm – women
- - 0.89 cm - men

OBSERVATIONS AND RESULTS

Table 1: Association of BMI and HTN.

BMI	No. of Pt with Essential HTN
Underweight	1
Normal weight	15
Overweight	4
Obese	10
Total	**30**

Table 2: Percentage of patients with BMI and HTN

BMI	% ofPts with Essential HTN
Underweight	3
Normal weight	50
Overweight	13.3
Obese	33.7
Total	**100**

Table 3: Gender wise observation

BMI	Frequency of HTN in males	Frequency of HTN in Females
Underweight	0	1
Normal weight	8	4
Overweight	2	2
Obese	2	6
Total	**12**	**13**

Table 4: Waist circumference and Essential HTN

Waist circumference	Frequency	Percentage
Normal	5	17
Increased	25	83
Total	**30**	**100**

Table 5: Waist circumference in male and female and essential HTN

W. C.	Frequency of HTN in male	Frequency of HTN in Female
Normal	4	5
Increased	10	11
Total	**14**	**16**

Table 6: W/H ratio and Essential HTN

W / H	Frequency	Percentage
Normal	14	46.6
Increased	16	53.4
Total	**30**	**100**

Table 7: W/H ratio in Male, Female and Essential HTN

W/H Ratio	Male Frequency	Female Frequency
Normal	4	6
Increased	10	10
Total	**14**	**16**

DISCUSSION

- Most of the studies in western world clearly correlates with BMI with CVD risk. Increasing BMI directly correlates with increasing risk of CVD irrespective of other risk factors.
- In our study, in contrary we are observing that patients with high W.C. and W/H ratio are at more risk of developing essential hypertension than patients with high BMI.
- This has been observed in male as well as females i.e. in both genders.

CONCLUSION

- Though the BMI, W.C, W/H ratio all are important risk factors for development of young onset essential hypertension, the later two are more important.
- In patients coming with and diagnosed as young onset essential hypertension, increased W.C. and increased W/H ratio is more sensitive indicator than BMI, which is contrary to other international studies especially western countries studies.

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