

Prevalence of obesity and high normal blood pressure in rural population

M. Lanord Stanley Jawahar* and D. Elantamilan

Department of Medicine, Tagore Medical College and Hospital, Rathinamangalam, Vandalur Post, Chennai- , India,
lanordstanley@yahoo.com*

Abstract

Introduction: Obesity is the best predictor for the development of hypertension. Weight loss and life style modification are the two major preventive measures for the development of Hypertension and diabetes.

Objective: This study was done to determine the prevalence of Obesity and high normal blood pressure (pre-hypertension) and to identify the association between the two.

Materials and methods: A study was conducted on 311 individuals who attended the medicine OPD over 6 months for detecting high blood pressure and obesity. The participants were subjected to anthropometric and clinical evaluation for detection of obesity and pre-hypertension.

Results: Among the total 311 study participants about 108 (34.72%) had pre-hypertension and 62% of them were obese. Among obese individuals, 49.2% had Stage I pre-hypertension and 50.76% Stage II pre-hypertension. The prevalence of pre-hypertension was found to be high in individuals with obesity and found in non-obese individuals. **CONCLUSION:** The prevalence of pre-hypertension and its association with obesity excess was higher among the individuals in the rural setting of Chennai. Early detection of obesity and pre-hypertension can prevent the development of metabolic and cardio vascular disease.

Keywords: Pre hypertension, Obesity, Rural population, Life style modification, Primary prevention of hypertension.

1. Introduction

The prevalence of obesity has risen dramatically in the past 2 to 3 decades and has rapidly become the most important public health problem. Population studies shows that excess weight gain is the best predictor we have for the development of hypertension, and the relationship between BMI, waist circumference and systolic – diastolic Blood pressure is nearly linear in diverse populations throughout the world (Greenlund *et al.*, 2004). Risk estimates from Framingham heart study for example, suggests that approximately 78% of primary hypertension in men and 65% in women can be described to excess weight gain. Clinical studies also indicate that weight loss is an effective measure in reducing blood pressure in most hypertensive subjects and also has shown the effectiveness of weight loss in primary prevention of hypertension and diabetes (Mark, 2008). The mechanisms by which obesity causes hypertension are the activation of sympathetic nervous system (Landsberg, 2006), activation of Renin-Angiotensin-Aldosterone system (Schiffrin, 2006), physical compression of the kidneys from the fat surrounding the kidneys, increased renal tubular sodium reabsorption, increased tissue blood flow and cardiac output which expand the ECF volume. Some of the increased flow is caused by tissue growth in organs in response to increased work load and the metabolic demands associated with obesity (He & MacGregor, 2007). High BP accounts for 54% stroke and 47% heart disease worldwide. Half of this disease burden is in people with hypertension; the other half is in people with lesser degrees of high BP (pre-hypertension i.e. BP 120-139 / 80 to 89) (Chobanian *et al.*, 2003). The pre-hypertension can be further divided into two stages, stage I pre-hypertension: BP 120-129 / 80-84 and Stage II Prehypertension: BP 130-139 / 85-89 (Giles *et al.*, 2005). Stage II pre-hypertension and obesity also associated with the risk of Diabetes mellitus (Meisinger *et al.*, 2008).

2. Materials and methods

The participants were the clients who visited the hospital during the study period of 6 months, a sample of 311 individuals aged between 19 and 57 years were included in our study. The staff nurse took measurements like height, weight and waist circumference and also the other details of the patients were recorded. BMI was calculated by using height and weight by BMI Calculator, waist circumference was measured by the same inch tape by the staff nurse and also the same weighing machine for all the patients. BMI ≥ 25 kg/m² was taken as obesity, BMI between 23-24.9 kg/m² as overweight. Brachial blood pressure was measured with mercury sphygmomanometer by experienced medical personnel. In accordance with American Heart Association guidelines, BP was measured with a mercury sphygmomanometer in an office setting; the first and fifth phases of Korotkoff sounds were used for systolic

and diastolic BP. Appropriate cuff sizes were chosen for each subject's arm circumference. Skilled, trained physicians measured BP 3 times after subjects had rested for 15 minutes in the sitting position, and the average of the measurements was recorded. Values were taken as in table-1.

3. Result

In our study population, 62.1% were obese and 37.9% were non-obese among the total number of 311 individuals studied. The Prevalence of Prehypertension in general population was 34.72 and 54.62% of the pre-hypertensive were in Stage I and 45.38% were in Stage II. The Prevalence of Prehypertension in obese population was 33.68% and among them 49.2% were in Stage I and 50.76% were in Stage II. The Prevalence of Prehypertension in non-obese population was 36.4% among them 62.7% was in Stage I and 37.3% were in Stage II. (Table-2)

Table 1. Staging of office blood pressure

Bp stage	Systolic BP (mm HG)	Diastolic BP (mm HG)
Normal	<120	<80
Prehypertension (High normal Blood Pressure)	120-139	80-89
Stage 1 hypertension	140-159	90-99
Stage 2 hypertension	≥160	≥100

Table 2. Prevalence of obesity and prehypertension in our study population

Total population	311	100%
Prehypertensives	108	34.72%
stage I	59	54.62%
stage II	49	45.38%
Obese individuals	193	62.1%
Non-obese	118	37.9%
Obese individuals with PHT	65	33.67%
stage I	32	49.2%
stage II	33	50.76%
Non-obese individuals with PHT	43	36.4%
stage I	27	62.7%
stage II	16	37.3%

4. Discussion

Prehypertension and obesity were more prevalent in our community. These two factors included in the development of metabolic syndrome, and cardiovascular disease. Among 311 individuals studied in our population, 62% of them had obesity and Stage I & II pre-hypertension was found equally among them. Interestingly non-obese individuals also had pre-hypertension especially Stage I pre-hypertension (62.7%) indicating that there is a need for stress reduction, dietary changes, life style modifications other than weight reduction. Stage II Prehypertension and obesity invariably leads to hypertension hypertensive heart disease and diabetes. They require therapeutic measures like diet with less salt, dietary modification for Asian Indian, (Misra *et al.*, 2011) DASH (Dietary Advice To Stop Hypertension) diet and drug treatment. Obesity and pre-hypertension contribute to the development of diabetes, cardiovascular diseases and renal failure. Hence, early detection and intervention is beneficial to these individuals. Limitations of our study are small number of people were included in our

study and many of them lost follow up for blood pressure measurement ,weight reduction and detection of other risk factors like diabetes .

5. Conclusion

Individuals with high normal blood pressure are at a greater risk for developing hypertension than patients with normal blood pressure. Likewise individuals with obesity are at the risk of developing Diabetes. Weight reduction is an essential first step in the effective management of most of the patients with obesity and high normal blood pressure. Emphasis should be placed on the life style modifications that help patients to maintain healthier weight and prevent cardiovascular death. Modification of the patient's life style like sustained physical activity and balanced diet can prevent obesity and advancement of high normal blood pressure to stage I hypertension or to any level above. Measurements like height, weight, BMI and blood pressure can be used as simple outpatient measuring tools for screening hypertension, hypertensive heart disease, obesity and diabetes, since it adds no extra cost for detection in countries like ours.

6. References

- 1• Greenlund KJ, Croft JB and Mensah GA (2004) Prevalence of heart disease and stroke risk factors in persons with prehypertension in the United States, 1999-2000. *Arch. Intern. Med.* 164, 2113-2118.
- 2• Mark AL (2008) Dietary therapy for obesity: An emperor with no clothes. *Hypertension.* 51,1426.
- 3• Landsberg L (2006) A teleological view on obesity, diabetes and hypertension. *Clin. Exp. Pharmacol. Physiol.* 33, 863.
- 4• Schiffrin EL (2006) Effects of aldosterone on the vasculature. *Hypertension.* 47, 312.
- 5• He FJ and MacGregor GA (2007) Salt, blood pressure and cardiovascular disease. *Curr. Opin. Cardiol.* 22, 298.
- 6• Chobanian AV, Bakris GL, Black HR, et al (2003) Seventh report of the joint national committee on prevention, evaluation, and treatment of high blood pressure. *Hypertension.* 42, 1206-1252.
- 7• Giles TD, Berk BC, Black HR et al (2005) Exp3+69
- 8• anding the definition and classification of hypertension. *J. Clin. Hypertens.* 7, 505-512.
- 9• Meisinger C, Doring A and Heier M (2008) Blood pressure and risk of type 2 diabetes mellitus in men and women from the general population: the monitoring trends and determinants of cardiovascular diseases/cooperative health research in the region of Augsburg cohort study. *J Hypertens.* 26, 1809-1815.
- 10• Misra A et al. (2011) National dietary guidelines consensus group consensus dietary guidelines for healthy living and prevention of obesity the metabolic syndrome diabetes and related disorders in Asian Indians. *Diabetes Technol. Ther.* 13(6), 683-694.