

## Detecting the prevalence of microalbuminuria in hypertensive patients and its correlation with waist to height ratio

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### Abstract

**Background :** Hypertension is a Major Public Health problem in Adult population, affecting one in four people in developing countries. Chronic Hypertension is a major risk factor for coronary artery disease, stroke, Heart failure, Peripheral vascular Disease, vision loss and Chronic kidney disease. Among the risk factors of Hypertension, obesity acts a modifiable and independent risk factor for cardiovascular disease in hypertension. Waist to Height ratio/waist to stature ratio is the simplest anthropometric measure which acts as a screening tool for detecting cardiovascular risk in Hypertensive patients with central obesity. Microalbuminuria reflects vascular endothelial dysfunction and is a marker for generalized atherosclerosis. Thus it serves as a screening test for identifying cardiovascular risk in Hypertensive patients. **Aim:** To Identify the prevalence of Microalbuminuria and correlating the results with Waist to Height ratio in Hypertensive patients. **Materials and methods:** 50 Hypertensive patients and 50 Normotensives of age group between 25-60 yrs of both gender. **Results:** The Prevalence of microalbuminuria is about 38% among 50 hypertensives compared with 50 normotensives which is about only 6%. The p value was statistically highly significant (<0.001). There is also positive correlation between Microalbuminuria and Waist to Height ratio (W-Ht ratio). **Conclusion:** This study showed that, there is increased prevalence of microalbuminuria in hypertensives than normotensives and also positive correlation of results with waist to height ratio, which proves that both of which can be used as screening marker for early detection of cardiovascular disease in Hypertensive patients.

**Keywords:** atherothrombosis, cardiovascular disease, hypertension, microalbuminuria, screening marker, waist to height ratio.

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### Introduction

Hypertension (HTN) is defined as persistently high arterial blood pressure. The Prevalence of Hypertension is 33.2% among men and 31.7% among women in India and Prevalence of Hypertension in adults of age group 18- 25 yrs accounts about 12.1%.<sup>1</sup> In India, community

surveys have documented that in the last three to six decades, the Prevalence of Hypertension has increased about 30 times among the urban people due to sedentary lifestyle & unhealthy food habits and about 10 times in the rural people.<sup>2</sup>

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According to the Joint National Committee (JNC-VII), Hypertension is classified as the following,

S.No	Stages	Systolic BP(mm hg)	Diastolic BP(mm hg)
1	Normal	<120mmHg	<80mmHg
2	Prehypertension	120 to 139 mmHg	80 to 89 mmHg
3	Hypertension stage I	140 to159 mm Hg	90 to 99 mmHg
4	Hypertension stage II	≥160 mm Hg	≥100 mm Hg

Hypertension is one of the major risk factor for Cardiovascular Disease mortality accounting for 20 -50% of all deaths<sup>3</sup> Thus Hypertension is considered as a silent killer since symptoms are rare in its early stages until a severe medical crisis takes place like heart attack, stroke or chronic kidney disease. Obesity and hypertension are preventable risk factors for cardiovascular disease. Hypertension is about 6 times more frequent in obese subjects than in lean men and women<sup>3a</sup>For every 10 kg increase in body weight there is 3mm Hg increase in systolic blood pressure and 2.3-mm Hg increase in diastolic blood pressure. It is also estimated that there is 12% increased risk for cardiovascular disease and 24% increased risk for stroke.<sup>3b</sup>This increase in blood pressure is greatest when the obesity is of abdominal distribution i.e central obesity.<sup>3c,3d</sup>Obesity affects cardiovascular system by causing coronary heart disease, heart failure and sudden death. Obesity affect the heart through known risk factors such as dyslipidemia, hypertension, glucose intolerance and inflammatory markers. Increased Urinary Albumin Excretion has been considered as a marker of prevalent subclinical Atherosclerosis.<sup>4</sup>Microalbuminuria may be used as screening marker for cardiovascular risk in hypertension. Microalbuminuria is defined as an elevated urinary albumin excretion, exceeding normal levels without reaching the minimum levels that can be detected by routine laboratory methods, an albumin excretion between (30 to 300 milligrams) using albumin creatinine ratio in 24 hours. <sup>5</sup>It is a simple, noninvasive, nonexpensive biochemical test which may serves as a reliable indicator of Ischaemic heart disease. The

Prevalence of Microalbuminuria ranges between 15% to 40% in untreated hypertensive patients and is 20% in patients with treatment.<sup>6</sup>The Prevalence of Microalbuminuria increases with age and also with the duration of hypertension. Waist to height ratio /waist to stature ratio is another simplest, non invasive, screening method of detecting cardiovascular risk in hypertensives with central obesity. Waist to height ratio is measured by dividing waist circumference by height, the ratio should be approximately 0.53 for men and 0.54 for women. Waist circumference is measured midway between lower costal margin and iliac crest at the end of expiration. The waist circumference should be less than 108 cm for men and 88 for women .current guidelines states that adults and children waist circumference should be less than half of their height. There appears to be a linear relationship between the degree of urinary albumin excretion and cardiovascular risk in Hypertensives. Thus intervention and prevention of cardiovascular complications in Hypertensive patients can be screened at a earlier stage by measuring waist to height ratio and Microalbuminuria.

### Materials and methods

After obtaining Institutional Ethical committee clearance, this cross sectional study was conducted in Medical OPD in Tirunelveli Medical College Hospital. 100 subjects were included in this study based on inclusion and exclusion criteria.

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### Inclusion criteria

Cases: Hypertensive patients in age group of 25-60 yrs of both gender. Controls: Normotensives in age group of 25-60 yrs of both gender.

### Exclusion criteria

Hypertension associated with Diabetes mellitus, Ischemic heart disease, Bronchial asthma, Rheumatoid arthritis, chronic kidney disease, End stage renal failure, Nephrotic syndrome, Pregnancy and Patients under steroid therapy.

Table no 1

S no	Parameters	Mean	Std. Deviation
1	AGE (yrs)	54.06	5.903
2	Systolic BP (mm Hg)	128.82	13.184
3	Diastolic BP (mm Hg)	82.20	6.448
4	Duration of Hypertension(yrs)	5.04	1.498
5	BMI(wgt in kg/Ht in m <sup>2</sup> )	25.352 0	3.14239
6	Height(cms)	157.90	6.185
7	WT(kg)	64.80	9.243
8	Waist to Height ratio	.4826	.04777

50 Cases and 50 controls were selected based on project questionnaire method. Informed written consent were obtained from cases and controls in their own language. A detailed medical history taken, anthropometric measurements like Height(cms) is measured using stadiometer. Weight(kg) is measured using pre calibrated weighing scale after adjusting to zero .Waist circumference is measured using inch tape at the level of belly button midway between costal margin and iliac crest at the end of expiration .waist to height ratio/waist to stature ratio is calculated by dividing waist circumference by height. After 5 minutes of rest and in case of smoking and coffee ingestion after 30 minutes, blood Pressure is recorded on both arms with a Mercury sphygmomanometer for both cases and controls. Recordings were repeated after 5

minutes. Blood Pressure recordings were based on American heart association guidelines .After excluding history of strenuous exercise, fever and inflammation disorders, Random spot urine sample was collected and results were assessed for Microalbuminuria within four hours of urine collection in Biochemistry laboratory using fully Automated analyzer(immune turbidometric assay).

### Results

In this cross sectional study, cases and controls were age and gender matched . Out of 50 cases, 19 were positive for urine microalbuminuria which accounts about 38% and 31were negative. Out of 50 controls 3 were positive which accounts about 6% and 47 were negative for microalbuminuria. Results were statistically assessed by SPSS version. Statistically significant results p value (<0.001) were obtained using pearson correlation. There is

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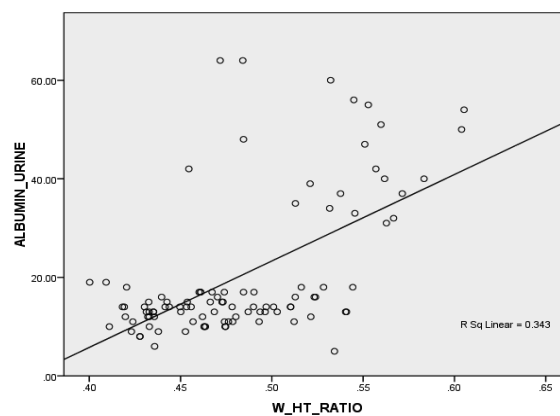
also positive correlation of microalbuminuria results with waist to height ratio in hypertensive patients . Thus both microalbuminuria and waist to

height ratio /Waist to stature ratio can be used as routine screening tool for identifying cardiovascular risk in hypertensive patients.

**Table no 2 : Prevalence of microalbuminuria in hypertensives and normotensives**

Subjects	Microalbuminuria	
	Positive	Negative
Hypertensives (50 Cases)	19 38.0%	31 62.0%
Normotensives (50 Controls)	3 6.0%	47 94.0%
Total (50 Cases+ 50 Controls)	22 22.0%	78 78.0%

**Correlation between microalbuminuria and waist to hip ratio**



## **Discussion**

This study was conducted to identify the cardiovascular risk in Hypertensive patients using Microalbuminuria and waist to height ratio. Obesity is now becoming a global epidemic affecting not only adults but also children. It is associated with many comorbidities like Hypertension, Type II Diabetes mellitus, Cardiovascular disease and sleep apnea . Obesity directly affects cardiovascular homeostasis by increasing blood volume and cardiac output due to increased metabolic demand. Decreased physical activity, sedentary lifestyle & unhealthy food habits leads to obesity which is one of the modifiable risk factor for hypertension and also acts as independent risk factor for cardiovascular disease. This is one of the reason behind increased prevalence of Hypertension in urban population. Waist to height ratio /waist to stature ratio is an upcoming non invasive anthropometric screening measure in early detection of cardiovascular risk in obese hypertensive patients. Currently many studies proved that waist to height ratio acts as a better screening measure than Body mass index(BMI). Study from the south Indian population reported a prevalence of obesity of about 27% during 1989 in urban Chennai and 2% in rural Tamil Nadu.<sup>7</sup> Subsequent studies from urban Chennai reported the prevalence of overweight/obesity at 23% in the year 1995 and 30% during 2000.<sup>8</sup> Prevalence in the rural areas of Tamil Nadu has increased from 2% in 1989 to 17% in 2003.<sup>9</sup> Majority of hypertensive patients are obese particularly of central obesity. Raised blood pressure is a major risk factor for cardio vascular disease. Hypertension is directly responsible for 24% of all coronary heart disease (CHD) deaths in India.<sup>10</sup> Normally glomerulus do not allow leakage of protein into urine. In Hypertension, due to increase in intracapillary pressure or structural damage of the glomerular membrane leads to leakage of plasma protein into urine.<sup>11</sup> Obesity also acts an independent risk factor for microalbuminuria.<sup>12</sup> Obesity is associated with abnormal endothelial function due to increased oxidative stress. There is increased release of proinflammatory cytokines from adipose tissue and decreased nitric oxide production, thereby causing endothelial dysfunction. Microalbuminuria

reflects endothelial dysfunction, along with albumin, there is also leakage of atherogenic lipoprotein Low Density Lipoprotein particles into the arterial wall causing chronic low grade inflammation leading to atherothrombosis.<sup>13</sup> Atherothrombosis is a process in which endothelial dysfunction and chronic low-grade inflammation occurs.<sup>14</sup> Thus early intervention can be done by assessing waist to height ratio and urine albumin creatinine ratio in hypertensives which helps in reducing the mortality of cardiovascular disease.<sup>15</sup>

## **Limitations**

Single BP recording taken in this study which can be repeated thrice a week. Random spot urine sample are taken instead of 24 hours collection.

## **Conclusion**

We conclude that there is increased prevalence of microalbuminuria in Hypertensives and positive correlation between albumin excretion & waist to height ratio in obese hypertensives compared with than that of lean hypertensive patients. Thus both waist to height ratio and Microalbuminuria can be used as routine screening tool in all newly diagnosed hypertensives patients for identifying cardiovascular disease at a earlier stage.

**Acknowledgements :** Nil

**Conflict of interest :** Nil

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