Frequency of Microalbuminuria in Hypertensive patients with left ventricular hypertrophy

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ABSTRACT

INTRODUCTION: Essential hypertension produces clinical proteinuria and a significant reduction in renal function in 5-15% of patients. More precise information about the relation between microalbuminuria and cardiovascular risk would not only help clinicians better estimate the patient’s absolute risk but also strengthen the decision to initiate antihypertensive treatment, since current guidelines consider not only blood pressure but also target organ damage (for example, albuminuria).

METHOD: Patients included were previously treated or untreated hypertension with electrocardiographically confirmed left ventricular hypertrophy or by two dimensional echocardiography. A single void morning urine sample was used to measure microalbuminuria by immunoturbidimetry method. It was regarded as positive when test result was ≥ 20 mg/l. Data analysis was done using chi-square test, t-test and logistic regression with SPSS software program, version 11.5.

RESULT: Out of 64 hypertensive patients 40(62.5%) had microalbuminuria positive. Among 32 hypertensive patients with LVH 27(84.5%) had microalbuminuria and 32 hypertensive patients without LVH 13(40.60%) had microalbuminuria positive in spot morning urine analysis. Mean UAE was 8.90 ± 4.77 in hypertensive patients without LVH and 47.76 ± 26.848 in LVH (P<0.001).

Conclusion - In patients with hypertension, left ventricular hypertrophy was associated with increased prevalence of microalbuminuria compared to patients without left ventricular hypertrophy.

KEY WORDS: Microalbuminuria, Hypertension, Left ventricular hypertrophy.

INTRODUCTION

Hypertension is the most important modifiable risk factor for cardiovascular disease.1 It is also an established risk factor for myocardial infarction, stroke and peripheral vascular disease.

In particular, the presence and degree of subclinical target organ damage namely left ventricular hypertrophy, carotid atherosclerosis, and renal dysfunction should be carefully searched for. The prevalence of microalbuminuria in untreated hypertensive patients ranges from 20 to 40% according to the method used.2

Left ventricular hypertrophy is an independent predictor of adverse prognosis and is related to albumin excretion independent of age, blood pressure, diabetes, race, serum creatinine level, or smoking; these associations suggest parallel cardiac damage and increased renal albumin excretion rate.3 Sub clinical organ damage often precedes and predicts the development of morbid events. Thus, patients with left ventricular hypertrophy, especially the concentric type, show a higher risk of developing a coronary event or a stroke as compared with those with normal left ventricular geometry.4 So, noninvasively detecting the presence of left ventricular hypertrophy, not only gather important information to help individualize treatment but also help to monitor the effectiveness of treatment. Furthermore, in the presence of renal damage (renal dysfunction or proteinuria), lower BP goals (<130/80 mmHg) are recommended.

The term Microalbuminuria - a urinary albumin excretion (UAE) between 20 and 200µg/min (30 - 300 mg/24 hr) has been introduced to identify subjects at
increased risk of renal and cardiovascular disease. The increase of UAE above 200µg/min is defined as overt nephropathy. Microalbuminuria reflects functional and potentially reversible abnormalities initiated by glomerular hyperfiltration, normally associated with glomerular filtration rate (GFR). When GFR decline; it may result in end-stage renal disease. Thus, the limit of 200µg/min segregates patients with albuminuria or proteinuria who are at quite different risk.

A diagnosis of microalbuminuria can be made by measuring its excretion rate during 24 hours or in an overnight urine collection, or by measuring albumin/creatinine ratio or albumin concentration in the morning or a random urine sample. Determination of UAE in the morning urine sample constitutes the ideal test for screening microalbuminuria. Different assays can be used to measure UAE including immunoturbidimetry and radioimmunoassay. Immunoturbidimetry is more sensitive and cost effective method to identify microalbuminuria. The accepted cut-off values for detection of microalbuminuria are 20µg/min. However, a study suggested that the risk for cardiovascular disease in arterial hypertension was increased at even lower UAE levels of 15µg/min.

It is now apparent that between 5 and 10% of nondiabetic individuals had UAE within the microalbuminuric range. An association between smoking, alcohol intake and microalbuminuria had also been shown. Patients with microalbuminuria were older and exhibit predominant male gender, as compared with normoalbuminuric subject. Interestingly, recent data by Jiang et al indicate that the association between blood pressure and UAE was stronger in blacks than in whites, which supports the notion that blacks may be more susceptible to renal damage from relatively low levels of blood pressure increase.

More precise information about the relation between microalbuminuria and cardiovascular risk would not only help clinicians better estimate the patient’s absolute risk but also strengthen the decision to initiate antihypertensive treatment, since current guidelines consider not only blood pressure but also target organ damage(for example, albuminuria). As 25% of patients with end stage renal disease have hypertension as the primary diagnosis it becomes paramount importance to study UAE and progression of nephropathy in hypertensive patients. Such study was done in India by Prof. S. Jalal and his colleague, and found that microalbuminuria was prevalent in 37.5% of patients with essential hypertension and may be an early marker for end-organ damage susceptibility. As such study was not performed in Nepal; we did this study to look at the frequency of microalbuminuria among hypertensive patients with LVH. For control group, we had taken hypertensive patients without LVH. Probably our information would enable physicians to determine the treatment focus more effectively and these patients would probably experience the greatest benefit from appropriate interventions if instituted promptly.

METHODE

Study was conducted at Bir Hospital, NAMS, Mahaboudha and Shree Birendra Hospital, Chauni between March 2007 to Feb 2008.Total 64 patients (Previously treated or untreated hypertension) above 18 years of age were taken, out of which 32 LVH patients (measured by ECG Sokolow–Lyon voltage -SV1+ (RV5 or RV 6) > 35 mm or by two dimensional echocardiography [Normal thickness of interventricular Septum( IVS ) and posterior wall of left ventricle is from 0.6 to 1.1 cm (as measured at the very end of diastole), if IVS and posterior wall of left ventricle is ≥1.2 cm thick]were taken. For control group hypertensive patients without LVH were included. Any Patients with presence of albumin, pus cells and RBCs in urine routine examination, diabetic patients and renal insufficiency were excluded. Similarly Prostatic enlargement, congestive cardiac failure and history of febrile illness were also excluded.Then patients underwent microalbumin test. A single void morning urine sample at the baseline examination was used to measure microalbuminuria by immunoturbidimetry method. It was regarded as positive when test result was ≥ 20 mg/l and negative when test result was < 20 mg/l.

Data analysis was done using chisquare test, t-test and logistic regression with SPSS software program, version 11.5.

RESULT

Out of 64 hypertensive patients 40(62.5 %) had microalbuminuria positive. Among 32 hypertensive patients with LVH 27(84.5%) had microalbuminuria and in 32 hypertensive patients without LVH 13(40.60 %) had microalbuminuria positive in spot morning urine analysis. Mean UAE was 8.90 ± 4.77 in hypertensive
patients without LVH and 47.76± 26.848 in LVH (P<0.001).

<table>
<thead>
<tr>
<th>Hypertensive Patients</th>
<th>Microalbuminuria</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>With LVH</td>
<td>27 (84.4 %)</td>
<td>5 (15.60 %)</td>
</tr>
<tr>
<td>Without LVH</td>
<td>13 (40.6 %)</td>
<td>19 (59.4 %)</td>
</tr>
</tbody>
</table>

Table 2. Comparison of presence of microalbuminuria in relation to sex Of Patients.

<table>
<thead>
<tr>
<th>Sex of Patient</th>
<th>Microalbuminuria</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absence</td>
</tr>
<tr>
<td>Male</td>
<td>23 (67.6 %)</td>
<td>11 (32.4 %)</td>
</tr>
<tr>
<td>Female</td>
<td>17 (56.7 %)</td>
<td>13 (43.3 %)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (62.5 %)</td>
<td>24 (37.5 %)</td>
</tr>
</tbody>
</table>

Table 3. Comparison of presence of microalbuminuria in relation to age.

<table>
<thead>
<tr>
<th>Age of Patients Years</th>
<th>Microalbuminuria</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absence</td>
</tr>
<tr>
<td>18 – 39</td>
<td>2 (33.33 %)</td>
<td>4 (66.7 %)</td>
</tr>
<tr>
<td>40 -59</td>
<td>17 (65.4 %)</td>
<td>9 (34.6 %)</td>
</tr>
<tr>
<td>60 -69</td>
<td>14 (63.6 %)</td>
<td>8 (36.4 %)</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>7 (70.0 %)</td>
<td>3 (30.0 %)</td>
</tr>
</tbody>
</table>

DISCUSSION

Hypertension per se is a major cardiovascular risk factor among which left ventricular hypertrophy remains a major complication of uncontrolled hypertension.

The present study showed hypertensive patients with left Ventricular hypertrophy had higher frequency of urinary albumin excretion. The conventional method of detecting renal damage in hypertensive patients which include the measurement of blood urea nitrogen, creatinine and proteinuria, are relatively insensitive and only show abnormalities when the disease process is advanced. New evidence from the Losartan Intervention for Endpoint Reduction in Hypertension Study indicates that changes in urinary albumin excretion under antihypertensive treatment parallel those of ECG-determined left ventricular mass and study also showed a 4- to 5-fold increase in risk for cardiovascular events from the lowest to the highest decile of baseline urinary albumin excretion rate. In another publication from the same hypertensive population showed that high urinary albumin excretion rate was related to LVH and was independent of age, blood pressure, diabetes, race, serum creatinine, or smoking suggesting parallel cardiac damage and albuminuria. They found microalbuminuria in (29%) hypertensive patients with left ventricular hypertrophy. In our study microalbuminuria was found in 62.5% of hypertensive patients among which42.18%patients with microalbuminuria had LVH. The prevalence of microalbuminuria is not well established and it may vary from 15 –100 %².

The prevalence and clinical course of abnormal urinary albumin excretion in patients with hypertension is quite heterogeneous. Heterogeneity in progression of albuminuria is determined by baseline urinary albumin excretion rate, stages of hypertension and its complication like left ventricular hypertrophy and duration of hypertension. This variation is probably due to difference in the age, race, severity of hypertension and coexistent renal disease in these study populations. Table 3 shows a comparison of presence of microalbuminuria in relation to age. Frequency of MA in sex groups of study population is described in Table 2. The study showed there was no significant association between age, sex and microalbuminuria in urine (0.47 and 0.36 respectively). The relative frequency was same in both sexes. There were 34 (53.14 %) male patients and 30 (46.86 %) female patients. Age of the patients ranged from 32 years - 79 years, mean age for positive microalbuminuric was 57.10 yrs and for negative microalbuminuric group 56.75 yrs.

There has recently been considerable interest in the quantitative measurement of albuminuria to detect subtle effects of hypertension on the kidney. Thus, given its wide availability and relatively low cost, determination of albuminuria could become a useful tool in the evaluation of global cardiovascular and renal risk.

We studied 64 patients with hypertension with nil albumin excretion in routine urine examination and found that urinary albumin excretion rates were significantly greater in hypertensive patients with LVH than in patients without LVH groups (P < 0.001) which
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is consistent with previous studies\(^7,12\) and in LIFE Study patients with LV hypertrophy had higher prevalences of microalbuminuria (average 26%-30%, P <.001).

In the present study, microalbuminuria was documented in 84.4% of hypertensive patients with LVH while only 59.4 % in patients without LVH groups. It points toward the subclinical and subtle changes occurring in the glomeruli of these patients. Thus, with increasing albumin excretion renal damage and related hypertension may go along with the progression of LVH. Recently, mild or moderate decreased creatinine clearance was also found to be associated with an elevated risk of cardiovascular events as well as with LVH.\(^11\) Several studies have indicated that the presence of proteinuria or microalbuminuria is an independent predictor of cardiovascular morbidity and mortality in patients with essential hypertension.\(^13\)

Few results are comparable with most of the previous studies but results can not be generalized as the study has limitations like small sample size, microalbumin test was done twice and study cover only two hospitals in Nepal. Obviously further prospective large studies are needed to assess the predictive value of microalbuminuria in hypertension covering wide area of the country. The aspect that makes it more attractive than some of the other emerging risk markers are that microalbuminuria is a modifiable risk factor whose correction, would reduce, in its own right, the incidence of cardiovascular disease morbidity and mortality.

**CONCLUSION**

We concluded that microalbuminuria was found frequent among hypertensive patients with left ventricular hypertrophy.

Thus it may be an early marker to find end-organ damage susceptibility.

**REFERENCES**

2. Wachtell K, Olsen MH; Dahlof B, Devereux RB et al; Microalbuminuria in hypertensive Patients with left ventricular Hypertrophy, The Life Study, J hypertens 2002;20;405;-12