Original Research Article

A study on microalbuminuria in systemic hypertension as an indicator of target organ damage in adult patients at Chengalpattu District

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Abstract

Background: Hypertension is one of the most common worldwide diseases afflicting humans. Because of the associated morbidity and mortality and the cost to society, hypertension is an important public health challenge. Over the past several decades, extensive research, widespread patient education, and a concerted effort on the part of health care professionals have led to decreased mortality and morbidity rates from the multiple organ damage arising from years of untreated hypertension.

Aim and objectives: To correlate the presence of microalbuminuria and the presence of subclinical target organ damage in patients with essential hypertension, to ascertain the relationship between the amount of albumin excreted and the severity of target organ damage.

Materials and methods: The study was conducted in the Karpaga Vinayaka Institute of Medical Sciences in the year 2018-2019. 250 patients, newly diagnosed or recently diagnosed (less than one year, on treatment), essential hypertensives following up at the hypertensive clinic, totally 100 patients were included in the study. Written consent was obtained from all patients participated in the study. A detailed case record was prepared for each patient on the basis of specially designed proforma. The important factors considered in history were the duration of hypertension and treatment; the history of smoking; symptoms pertaining to the cardiovascular and nervous system which could possibly suggest target organ damage.

Results: There was a statistically significant increase in the prevalence of microalbuminuria among patients with hypertension of a long duration ($p<0.05$). The mean BMI of the study group was 24.03. The mean systolic blood pressure in the study population was 159.2±24.27 mm Hg. Cases with microalbuminuria, the mean systolic blood pressure was 169.9±29.49 mm Hg, when compared to cases with normoalbuminuria, mean systolic blood pressure was 150.6±18.10 mm Hg. (p 0.00). The mean diastolic blood pressure in the study population was 96.86±14.34 mm Hg. Cases with microalbuminuria, the mean diastolic blood pressure was 99.38±13.89 mm Hg, when compared to cases with normoalbuminuria, mean diastolic blood pressure was 94.54±14.49 mm Hg (p 0.92) which was not statistically significant. The mean cholesterol level in the present study was 193.8±25.68 mg/dl. In cases with microalbuminuria the mean total cholesterol was 211.1 ± 30.36 mg/dl when compared to cases with normoalbuminuria, the mean total cholesterol was 178.7 ±13.68 mg/dl, which was statistically significant (p 0.000). The serum creatinine levels were higher in microalbuminuric cases (1.1±0.32 mg/dl) as compared to normoalbuminuric cases (0.97±0.27 mg/dl). This was statistically significant (p 0.030).

Conclusion: Subclinical target organ damage is common in systemic hypertension, the probability of which is significantly increased in patients with microalbuminuria. In patients with microalbuminuria, the severity of target organ damage is directly related to the amount of albumin excretion in urine. Microalbuminuria is an independent risk factor for target organ damage in systemic hypertension.

Key words

Microalbuminuria, Systemic Hypertension, Indicator, Target organ damage.

Introduction

Elevated arterial pressure is probably the most important public health problem in all countries. It is common, asymptomatic, readily detectable, usually easily treatable and often leads to lethal complications if left untreated. Although the understanding of the pathophysiology of elevated arterial pressure has increased, in 90 to 95% of cases the etiology (and thus potentially the preventive cure) is still largely unknown [1]. As a consequence, in most cases, hypertension is treated non-specifically leading to a large number of minor side effects and a high non-compliance rate. Left untreated hypertension increases the incidence of an early demise, Stroke, coronary events, heart failure, renal failure, and retinopathy [2] to the National Kidney Foundation, microalbuminuria is defined as a Urine Albumin Excretion Rate (UAER) of approximately 30-300mg/d in non-ketotic sterile urine. The association between microalbuminuria and hypertension was described a long time ago [3]. Microalbuminuria possibly reflects a state of increased renal endothelial permeability and is an easily measured marker of rather diffuse endothelial dysfunction, low-grade inflammation, and vascular disease burden [4]. Hypertension has been ranked as the fourth largest mortality risk factor in the world accounting for 6% of all deaths. Mild hypertension accounts for the largest proportion of cardiovascular deaths of its high prevalence. Microalbuminuria has recently emerged as a marker of widespread vascular damage in essential hypertension [5]. Hypertensives with microalbuminuria were found to have a significantly higher prevalence of coronary artery disease, hypertensive retinopathy, and cerebrovascular disease when compared to their normoalbuminuric counterparts [6]. Microalbuminuria is an early marker of target organ damage in essential hypertension. Various studies have shown a prevalence rate of microalbuminuria ranging from 4.7% to 46% in essential hypertension. The main determinant of albumin excretion rate in subjects with mild hypertension and no cardiovascular complications seems to be the hemodynamic load, whereas in subjects with more severe hypertension and associated target organ damage, augmented urinary leak is probably the

consequence of glomerular damage [7]. It has been clearly demonstrated that microalbuminuria is a risk factor for the development of clinical proteinuria, renal failure and increased cardiovascular mortality in insulin-dependent diabetes mellitus. The studies show that microalbuminuria also predicts the development of proteinuria and a decline in renal function in hypertension [8].

Materials and methods

The study was conducted in the Karpaga Vinayaka Institute of Medical Sciences in the year 2018-2019. 250 patients, newly diagnosed or recently diagnosed (less than one year, on treatment), essential hypertensives following up at the hypertensive clinic, totally 100 Patients were included in the study. Written consent was obtained from all patients participated in the study. A detailed case record was prepared for each patient on the basis of specially designed proforma. The important factors considered in history were the duration of hypertension and treatment; the history of smoking; symptoms pertaining to the cardiovascular and nervous system which could possibly suggest a target organ damage.

Exclusion criteria: Patients older than 60 years, Hypertension duration > 1 year, Diabetes mellitus, chronic kidney disease, chronic heart failure, Positive history (or) clinical evidence of IHD, Patients on diuretics, ACEIs, ARBs, Severe obesity.

Diagnosis of essential hypertension was made after a complete medical history, physical examination and routine biochemical evaluation. Hypertension was defined according to the criteria in the European Society of Hypertension – European Society of Cardiology 2003 guidelines for hypertension as average blood pressure ≥ 140/90 mmHg at least two different occasions or by the presence of antihypertensive treatment. On the study day, after an overnight fast, height and weight measured and venous blood was drawn in order to measure hematological parameters. Blood pressure was measured with the patient in the sitting position after a 5 min rest, with a mercury sphygmomanometer (cuff size 12.5 x 40 cm). The SBP and DBP were read to the nearest 2 mmHg. The disappearance of Korotkoff's sounds (phase V) was the criterion for DBP. Body mass index (BMI) was calculated by the formula BMI = Weight (kg) / Height $(m)^2$. Standard 12 lead ECG was obtained for each patient. Serum creatinine, Blood urea, Serum electrolytes, Serum uric acid, Total cholesterol, Triglycerides, High-density lipoprotein – cholesterol (HDL-C) and other standard blood chemistry evaluations were performed according to routine methods. Low-density lipoprotein (LDL) – cholesterol was calculated using Friedewald's formula - LDL = TC – HDL-c – TGL/5 (IF TGL < 400 mg/dL) Creatinine clearance was calculated using Cockcroft – Gault's formula and expressed in ml/min.

Laboratory methods

Measurement of urine albumin excretion was done by collecting 24-hour urine samples from our patients. The method was based on the measurement of immunoprecipitation of albumin enhanced by polyethylene glycol at 340 nm. The specific antiserum was added in excess to buffered samples. The increase in absorbance caused by immunoprecipitation was recorded when the reaction reached its endpoint. Absorbance is proportional to the amount of antigen in solution. The patients were divided into cases and controls by measurement of urine albumin (30-300 cases, <30 control) respectively.

Echocardiography

All echocardiographic studies were performed in our Department of Cardiology using the ALOKA machine. Echocardiograms were obtained at rest with the patient's supine in the left lateral position, using standard parasternal and apical views. The overall monodimensional left ventricular measurements and the bidirectional (apical four and two-chamber views) obtained according to the recommendations of the American Society of Echocardiography. All

electrocardiograms were done by single observer blinded to the clinical characteristics of the patients under observation.

Statistical analysis

The patient's age, sex, weight, BMI, Serum lipid profile was matched. The occurrence of target organ damage by IMT, LV mass index and Fundal examination were tabulated and analyzed. Microsoft excel 2003 was used for analysis and Z tests were done to assess differences between percentages and differences between means. The correlation was evaluated by the software. Statistical significance was taken when P<0.05.

Results

In the present study, out of 100 essential hypertensive cases, 52 were found to have normoalbuminuria (range 0-30 mg/day) and 48 cases found to have microalbuminuria (range 30-300 mg/day). Among these patients 64 were males and 36 were females, with M:F = 1.78:1 (**Table – 1**).

Table - 1: Characteristics of the study population.

Parameters	**Study Group**
Age (Years)	56.77±11.61
Duration of essential hypertension (Years)	7.55±5.29
Systolic BP (mm. Hg)	159.2±24.27
Diastolic BP (mm. Hg)	96.86±14.34
FBS (mg / dl)	99.68±8.51
Serum creatinine (mg / dl)	1.0±0.03
Total cholesterol (mg / dl)	193.8±25.68

Table - 2: Clinico-demographic and biochemical profile of the cases with microalbuminuria and normoalbuminuria.

Parameters	**Micro-albuminuria**	**Normal-albuminuria**	**'t' value**	**'p' value**
Age (Years)	59.65±11.49	54.12±11.18	2.438	0.017
Duration of hypertension (Years)	11.06±5.24	4.12±2.22	8.499	0.000
Systolic BP (mmHg)	169. 9±29.49	150.6±18.10	3.906	0.000
Diastolic BP (mmHg)	99.38±13.89	94.54±14.49	1.702	0.92NS
FBS (mg/ dl)	99.42±8.69	99.92±8.42	0.292	0.771NS
Serum creatinine (mg/ dl)	1.1±0.32	0.97±0.27	2.201	0.030
Total cholesterol (mg/ dl)	211.1±30.3	178.7±13.68	6.981	0.000
24 hours urinary albuminuria (mg/ day)	112.6±82.67	19.37±5.96	8.113	0.000

Table - 3: Albuminuria and sex distribution.

Sex	**Microalbuminuria**	**Normoalbuminuria**	**Total**
Male	32(50%)	32(50%)	64
Female	16(44.4%)	20(55.6%)	36
Total	**48**	**52**	**100**

The mean age of 100 essential hypertensive cases in the present study population was 56.77±11.61 years ranging from 28 to 85 years. Out of these, 48 cases were microalbuminuric with a mean age of 59.65±11.49 years. 52 cases were normoalbuminuric with a mean age of 54.12±11.18 years (p 0.017). This showed that the age of the cases in the microalbuminuria group was more compared to the normoalbuminuria group. The mean duration of

essential hypertension in the study population was 7.55± 5.2 years. The mean duration of hypertension in microalbuminuric cases was 11.06±5.24 years, when compared to normoalbuminuric cases it was 4.12±2.22 years i.e. cases with microalbuminuria had a longer duration of hypertension compared to cases with normoalbuminuria (p 0.000). The mean systolic blood pressure in the study population was 159.2±24.27 mm Hg. Cases with microalbuminuria, the mean systolic blood pressure was 169.9±29.49 mm Hg, when compared to cases with normoalbuminuria, mean systolic blood pressure was 150.6±18.10 mm Hg. (p 0.00). The mean diastolic blood pressure in the study population was 96.86±14.34 mm Hg. Cases with microalbuminuria, the mean diastolic blood pressure was 99.38±13.89 mm Hg, when compared to cases with normoalbuminuria, mean diastolic blood pressure was 94.54±14.49 mm Hg. (p 0.92) which is not statistically significant. The mean cholesterol level in the present study was 193.8±25.68 mg/dl. In cases with microalbuminuria the mean total cholesterol was 211.1 ± 30.36 mg/dl when compared to cases with normoalbuminuria, the mean total cholesterol was 178.7 ±13.68 mg/dl, which was statistically significant (p 0.000). The serum creatinine levels were higher in microalbuminuric cases (1.1±0.32 mg/dl) as compared to normoalbuminuric cases (0.97±0.27 mg/dl). This was statistically significant (p 0.030) as per **Table - 2**.

Table - 4: Distribution of cases in relation to severity of hypertension and albuminuria.

Severity of Hypertension	**Micro-albuminuria No. of cases (%) Mean range of microalbuminuria**	**Normo-albuminuria No. of cases (%) Mean range of normoalbuminuria**	**Total**
Stage I	16(29.62%) 72.19±36.48 mg/day	38(70.37%) 19.64±6.15 mg/day	54
Stage II	32(69.56%) 132.1±92.6 mg/day	14(30.43%) 17.89±5.99 mg/day	46
Total	48	52	100

Table - 5: Distribution of cases in relation to duration of hypertension and albuminuria.

Duration (Years)	**Microalbuminuria**	**Normoalbuminuria**	**Total**
<1	1(11.1%)	8(88.9%)	9
1-5	4(10.3%)	35(89.7%)	39
6-10	20(68.9%)	9(31.1%)	29
11-15	16(100%)	0	16
>15	7(100%)	0	7
Total	**48**	**52**	**100**

Table - 6: Duration of hypertension in relation to albuminuria.

Duration (Yrs)	**Microalbuminuria**	**Normoalbuminuria**	**Total**
<10years	25 (32.5%)	52(67.5%)	77
>10years	23(100%)	0	23
Total	**48**	**52**	**100**

Out of 100 essential hypertensive cases, there were 64 males and 36 females in our study group. Out of which 32 (50%) males and 16 (44.44%) females had microalbuminuria. The remaining 32 (50%) males and 20 (55.6%) females had normoalbuminuria, which was statistically not significant and there was no correlation between microalbuminuria and sex of the hypertensive

cases. X^2=0.285; df=1; p=0.594 (Non-Significant) as per **Table – 3**.

Out of 100 essential hypertensive cases in present study, 54 cases belong to stage I hypertension out of these 54 cases, 16 cases (29.62%) were microalbuminuric, with mean range of microalbuminuria of 72.19±36.48 mg/day and 38 (70.37%) cases were normoalbuminuric with mean range of normoalbuminuria of 19.64 ±6.15 mg/day. The remaining 46 cases belong to stage II hypertension, out of these 46 cases, 32 cases (69.56%) were microalbuminuric with a mean range of microalbuminuria of 132.1±92.6 mg/day and 14 cases (30.43%) were normoalbuminuric with a mean range of normoalbuminuria 17.89±5.99 mg/day. This shows that the quantity of microalbuminuria increases with the severity of hypertension i.e. the quantity of microalbuminuria is more in patients with stage II hypertension as compared to stage I hypertension, which is statistically significant (p0.000). X2=15.871; df=1; p=0.000 (**Table – 4**).

Table - 7: Grades of retinopathy in relation to albuminuria.

Grades of Retinopathy	Micro-albuminuria	Normal-albuminuria	Total No of cases
N	0	34(100%)	34
I	15(46.88%)	17(53.12%)	32
II	24(96%)	1(4%)	25
III	7(100%)	0	7
IV	2(100%)	0	2
Total	**48**	**52**	**100**

Table - 8: LVH on echo in relation to albuminuria.

Parameters	MAU	NAU	Total
No. LVH	6(11.76%)	45(88.24%)	51
LVH +	42(85.7%)	7(14.3%)	49
Total	**48**	**52**	**100**

Table - 9: Albuminuria in relation to the ischemic heart disease.

Parameters	Micro-albuminuria	Normo-albuminuria	Total
No history of IHD	33(42.86%)	44(57.14%)	77
With history of IHD	15(65.22%)	8(34.78%)	23
Total	**48**	**52**	**100**

Table - 10: Albuminuria in relation to history of stroke/ TIA.

Parameters	Microalbuminuria	Normo-albuminuria	Total
No history of stroke /TIA	31(38.75%)	49(61.25%)	80
With history of stroke/ TIA	17(85%)	3(15%)	20
Total	**48**	**52**	**100**

Out of the total 100 essential hypertension cases in the present study, 48 cases had microalbuminuria. In that 1 out of 9 cases (11.1%) belong to <1-year duration of hypertension, 4 out of 39 cases (10.3%) were belong to 1 to 5 years duration of hypertension, 20 out of 29 cases (68.9%) belonged 6 to 10 years duration of hypertension, 16 out of 16 cases (100%) belonged 11 to 15 years duration of hypertension and 7 out of 7 cases (100%) were belong to > 15 years duration of hypertension. The remaining 52 cases were found to have

normoalbuminuria, in that 8 out of 9 cases (88.9%) belong to < 1-year duration of hypertension, 35 out of 39 cases (89.7%) were belong to 1 to 5 years duration of hypertension, 9 out of 29 cases (31.1%) belonged 6 to 10 years duration of hypertension. In cases with > 10 years duration of hypertension, no cases were found to have normoalbuminuria. This showed that, as the duration of hypertension increases, the number of cases having microalbuminuria also increases (**Table – 5**).

In the present study, there were 77 cases belong to <10 years duration of hypertension in that 25 cases (32.5%) were microalbuminuric and 52 (67.5%) were normoalbuminuric. The remaining 23 cases belong to >10 years of duration of hypertension and all 23 cases (100%) were microalbuminuric. This indicates that longer the duration of hypertension more the number of cases will be microalbuminuric, which was statistically significant (p0.000). X^2=32.359; df=1;p=0.000 (**Table – 6**).

N=Normal, I-IV=grades of hypertensive retinopathy; Keith-Wagner-Barker classification cases having grade I retinopathy, 15 out of 32 cases (46.87%) had microalbuminuria. In cases having grade II retinopathy, 24 out of 25 cases (96%) had microalbuminuria. In cases having grade III retinopathy, 7 out of 7 cases (100%) had microalbuminuria. In grade IV retinopathy 2 out of 2 cases (100%) were found to have microalbuminuria. This shows that as the grades of retinopathy increases the number of cases having microalbuminuria also increases which were statistically significant (p 0.000) whereas in the normoalbuminuria group, most cases found to have either normal fundus or grade I hypertensive retinopathy. X^2=64.185; df=2; p=0.000 (Significant) as per **Table – 7**.

In the present study, 49 cases were found to have left ventricular hypertrophy, out of these 42 cases (85.7%) were microalbuminuric and 7 cases (14.3%) were normoalbuminuric. The remaining 51 cases were found to have no evidence of left ventricular hypertrophy, out of these 51 cases, 6 cases (11.76%) were microalbuminuric and 45 cases (88.24%) were normoalbuminuric. This showed that most numbers of cases having microalbuminuria found to have LVH when compared to normoalbuminuric essential hypertensive cases, which is statistically significant (p0.000). X^2=54.751; df=1; p=0.000 (Significant) as per **Table – 8**.

Out of 77 cases without a history of IHD, 33 cases (42.85%) was found to have microalbuminuria and the remaining 44 cases (57.14%) were normoalbuminuric. Out of 23 cases with a history of IHD, 15 cases (65.22%) were found to have microalbuminuria and the remaining 8 cases (34.78%) found to have normoalbuminuria. This shows that the maximum percentage (65.22%) of cases with IHD found to be microalbuminuric and which is statistically significant. In the present study number of patients with IHD having microalbuminuria was less and need a large study population. As IHD per se has an increased range of microalbuminuria (**Table – 9**).

Out of 80 cases having no history of stroke/ TIA, 31 cases (38.75%) were found to have microalbuminuria and the remaining 49 cases (61.25%) were normoalbuminuric. Out of 20 cases with a history of stroke/ TIA, 17 cases (85%) were found to have microalbuminuria and the remaining 3 cases (15%) were normoalbuminuric, which was statistically significant (p 0.000). This showed that a larger percentage (85%) of cases with a history of stroke/ TIA found to be microalbuminuric i.e. majority of strokes were associated with microalbuminuria.X^2 =13.711, df=1, p 0.000 as per **Table – 10**.

Discussion

Proteinuria even in small quantities found to be nephrotoxic. In the study, it was found that people with microalbuminuria at levels too low to detect with standard dipstick tests are at increased risk not only for pre-clinical nephropathy but also for cardiovascular

morbidity and mortality [9]. Hypertension and microalbuminuria commonly co-exist. The mechanism is controversial but is thought to be a renal manifestation of generalized vascular endothelial dysfunction and strongly linked with increased cardiovascular risk [10]. There is a need for early detection of significant microalbuminuria in essential hypertension, so that target organ damage can be prevented. In the present study, out of 100 essential hypertensive cases, 48 cases had microalbuminuria. The mean age of 100 essential hypertensive cases in the present study population was 56.77±11.61 years ranging from 28-85 years. Out of these, 48% of cases found to have microalbuminuria with a mean age of 59.65±11.49 years when compared to cases with normoalbuminuria, the mean age was 54.12±11.18 years (p 0.017). There were 64 males and 36 females in our study group, out of which 50% of males and 44.44% of females had microalbuminuria which is statistically insignificant [11]. Berkin KE, et al. microalbuminuria is not related to the sex of the patient.In the present study mean diastolic blood pressure was 99.38±13.89 mm Hg in the microalbuminuria group and 94.54±14.49 mm Hg in the normoalbuminuria group, which is not statistically significant (p 0.92) [12]. But in a study conducted by William B, et al. showed statistical significance with mean diastolic blood pressure in the microalbuminuria group, 98.15±11.65 mm Hg and in normoalbuminuria group 83.60±6.45 mm Hg. In the present study mean systolic blood pressure in microalbuminuria group 169.9±29.49 mm Hg and in normoalbuminuria group 150.6±18.10 mm Hg (p 0.000). Thus the magnitude of microalbuminuria correlates with the severity of hypertension, particularly with systolic blood pressure [3]. The study conducted by Ghai R, et al. found that a high percentage of hypertensives to be microalbuminuric. These patients with microalbuminuria had a significantly longer duration of hypertension, and the prevalence of microalbuminuria was higher in patients with severe hypertension. This would probably imply that, with increasing severity and duration of hypertension, damage to blood vessels becomes significantly more in various organ systems and also in the kidneys and is probably reflected as microalbuminuria. All microalbuminuric hypertensives demonstrated a higher prevalence of coronary artery diseases, cerebrovascular disease and hypertensive retinopathy, a reflection of widespread vascular damage [13]. Out of 100 essential hypertensive cases in present study, 54 cases belong to stage I hypertension, out of these 54 cases, 16 cases (29.62%) were microalbuminuric, with mean range of microalbuminuria of 72.19±36.48 mg/day and 38 (70.37%) cases were normoalbuminuric with mean range of normoalbuminuria of 19.64 ±6.15 mg/day. The remaining 46 cases belong to stage II hypertension, out of these 46 cases, 32 cases (69.56%) were microalbuminuric with a mean range of microalbuminuria of 132.1±92.6 mg/day and 14 cases (30.43%) were normoalbuminuric with a mean range of normoalbuminuria 17.89±5.99 mg/day. This shows that as the stage of hypertension increases the quantity of microalbuminuria also increases, which is statistically significant [14]. The present study also indicates that microalbuminuria correlates well with the duration of the disease. The incidence is quite constant for the first 5 years at around 10 to 11%, peaks to 68.9% at around 6 to 10 years and was nearly universal at around 11 to 15 years or more than 15 years duration of hypertension. In general, cases having less than 10 years duration of hypertension only 32.5% cases had microalbuminuria [15] whereas cases having more than 10 years duration of hypertension, almost all i.e. 100% cases had microalbuminuria. This indicates that longer the duration of hypertension more number of cases will be microalbuminuric and which is statistically significant (p 0.000).The mean duration of hypertension was 7.55±5.29 years was observed in the total study population. Patients with microalbuminuria had a mean duration of hypertension of 11.06±5.24 years and patients with normoalbuminuria had 4.12±2.22 years [16]. Studies conducted by Keen H, et al. microalbuminuria group and normoalbuminuria group mean duration of hypertension was 11.29 and 9.63 years respectively. The present study

showed a significant correlation between grades of hypertensive retinopathy in relation to microalbuminuria. In cases having grade I retinopathy, 15 out of 32 cases (46.87%) had microalbuminuria. In cases having grade II retinopathy, 24 out of 25 cases (96%) had microalbuminuria. In cases having grade III and grade IV retinopathy, all the cases (100%) were found to have microalbuminuria whereas in the normoalbuminuria group, most cases found to have either normal fundus or grade I hypertensive retinopathy [17]. The prevalence of retinopathy in the present study was 100% in cases having microalbuminuria with essential hypertension and 34.6% in normoalbuminuria with hypertension [18]. Similar observations with a high prevalence of retinopathy were also seen in other studies like Bigazzi R (82% Vs 73%). In the present study, 49 cases were found to have left ventricular hypertrophy, out of these, 42 cases (85.7%) were microalbuminuric and 7 cases (14.3%) were normoalbuminuric. The remaining 51 cases were found to have no evidence of left ventricular hypertrophy, out of these 51 cases, 6 cases (11.76%) were microalbuminuric and 45 cases (88.24%) were normoalbuminuric. This shows that most numbers of cases having microalbuminuria found to have left ventricular hypertrophy when compared to normoalbuminuria cases, which is statistically significant [19]. Pontremoli R, et al. showed a higher prevalence of concentric LVH and subclinical impairment of the left ventricular performance, as well as the presence of carotid atherosclerosis in patients with microalbuminuria. In the present study 23 cases presented with features of IHD. Out of which 15 cases 65.22% had microalbuminuria and the remaining 8 cases 34.78% had normoalbuminuria. Coming to 77 cases who had no features of IHD, but all were hypertensives, in which 42.85% had microalbuminuria and 57.14% had normoalbuminuria. This clearly indicates that microalbuminuria has more association with IHD [20].

Conclusion

In the present study, the prevalence of Microalbuminuria in essential hypertension was found to be 48%. Microalbuminuria in essential hypertension does not show any correlation with the sex of the patient. As the severity of hypertension increases, the degree of microalbuminuria also increases (severity of hypertension directly correlates with the degree of microalbuminuria). An increase in systolic blood pressure has a better correlation with microalbuminuria than diastolic blood pressure. All patients with essential hypertension with microalbuminuria had retinopathy, higher the microalbuminuria severe the grades of retinopathy. In cases with essential hypertension with microalbuminuria, 85% had LVH, 65% had IHD, 85% had cerebrovascular disease.

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