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A Study of Albuminuria and Fundus Changes in Newly Detected Hypertensive Patients in Pravara Rural Hospital, Loni

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Abstract: ***Objectives: To study the proportion of albuminuria and fundus changes in the eyes in newly detected hypertensive patients and to look for the evidence of target organ damage in newly detected hypertensive patients. Methodology: Two hundred twenty five newly detected hypertensive cases were evaluated for albuminuria and fundus changes after applying both inclusion and exclusion criteria. albuminuria was measured in these patients by urine analyzer and retinal changes by fundoscope. Results: Significant albuminuria was found to occur in essential hypertensive patients. The prevalence of albuminuria in this study was 56.4%. A positive correlation between albuminuria and target organ damage was found in these patients. Significant correlation between albuminuria and hypertensive retinopathy. (P value=0.001). Conclusion: Significant albuminuria and fundus changes was found to occur in essential hypertensive patients. Hence this significant correlation of albuminuria with essential hypertension makes it a prime importance to look for it much before it affects the targetorgan.***

Keywords: albuminuria; Hypertension; Target organ damage.

1. Introduction

Hypertension is a major public health problem all over the world. [1] It is one of the leading cause of the burden of the disease. Raised blood pressure affects more than one billion individuals and causes an estimated 9.4 million deaths in one year. Hypertension is most important modifiable risk factor coronary heart disease, heart failure, renovascular disease, stroke, and peripheral vascular disease. [1]

The incidence of hypertension in India is around 5 - 15% in adult population against 10 - 12% in the west[1]. The prevalence of hypertension in late nineties and early twentieth century varied among different studies in India, ranging from 2 - 15% in Urban India and 2 - 8% in Rural India. Hypertension causes clinical proteinuria and a significant reduction in renal function in 5 - 15% of patients. [2]

Increased UAE could be the consequence of an increased intraglomerular capillary pressure, that causes changes in the glomerular filtration barrier. Albuminuria possibly reflects the a state of increased renal endothelial permeability and is an easily measured marker of diffuse endothelial dysfunction, low grade inflammation and vascular disease burden. [3]

Hypertensive target organ damage is more common in albuminuric patients than normal individuals. Patients with higher UAE have higher prevalence of hypertensive retinopathy, higher left ventricular mass. A number of cardiovascular, pulmonary, and neurological symtoms are associated with hypertensive patients having target organ involvement. Focal neurological deficits, chest pain, loss vision, are considered as the commonest symptoms. [4]

Poorly controlled hypertension causes damage to the retinal microcirculation, so that recognition of hypertensive retinopathy at earliest is important. [5]

Hypertensive retinopathy follow three phases; first phase is vasoconstrictive, due to increase in luminal pressures and autoregulatory mechanisms causes the retinal arteriole narrowing and vasospasm to reduce blood flow. Second phase is sclerotic phase, intimal thickening of the layers of the endothelial wall, silver and copper wiring. Third phase is exudative phase, there is disruption of blood brain barrier and leakage of blood and plasma causes retinal haemorrhages, retinal ischemia and hard exudate. [6]

This study is intended to find out importance of detecting albuminuria and fundus changes in newly detected hypertensive patients with or without target organ damage and to correlate its significance as very few studies have been done.

2. Materials and Method

The patients admitted in ICU, WARDS in Pravara Rural Hospita, Loni with diagnosis of newly detected case of hypertension were studied from September 2018 to September 2020.

A Descriptive Observational study was conducted from two - year duration starting from 2nd September 2018 to 1st September 2020.225 patients selected by random sampling procedure matching the inclusion and exclusion criteria with proforma was used to collect the data of the patients.

Inclusion Criteria:

- All newly diagnosed hypertensive patients admitted in general wards and ICU inPravara Rural Hospital, Loni.
- Patient willing to give consent for the study of either gender.
- Age group more than 40 years.

Exclusion Criteria:

- Pre - existing chronic kidney disease.
- Patients with neurological deficits due to stroke or TIA.
- Patients with Diabetes Mellitus.
- Known case of hypertension on anti hypertensive medication

Diagnosis of Hypertension:

Hypertension was diagnosed on the basis of the blood pressure recorded in the upper arms with the help of Mercury Sphygmomanometer with cuff size 16 cm x 30 cm. For inpatients 3 readings were obtained by auscultatory method for the confirmation of diagnosis with 5 mins of interval, BP was taken with the patient sitting relaxed for 5 minutes, with arm was fully bared and supported at the level of the heart. Cuff was inflated 20 - 30 mmHg above the level of palpatory blood pressure, then cuff pressure was defleted 2 mmHg per second to listen the Korotkoff sounds. Systolic blood pressure recorded as the first Koratkoff sound and diastolic blood pressure as disappearance of all Korotkoff sounds respectively[22]. All the recordings more than 140/90 mmHg were considered as hypertension.

Classification of hypertension[2]:

1) Essential or primary hypertension: It is most common type and it is mostly familial. There is interaction between environmental and genetic factors.
2) Secondary hypertension: It is caused an identifiable underlying primary cause like kidney diseases, endocrine diseases, and tumors.

According to JNC VII classification of hypertension: [7]

Category	Blood Pressure (mmHg)	
	Systolic	Diastolic
Optimal	< 120	< 80
Pre hypertension	120 - 139	80 - 89
Hypertension		
Stage I	140 - 159	90 - 99
Stage II	> 160	>100

Patients were divided into Stage I and Stage II according to this classification.

Body mass index:

Weight was measured in kilogram and height was measured in meters in all ambulatory patients and BMI was calculated in kg/m2.

BMI= weight of the patient in Kg/height in meter square

Based on BMI, classification as follows[2]:

Classification	Body mass index (kg/m^2)	Obesity class	Disease risk
Underweight	<18.5	-	
Healthy weight	18.5 - 24.9	-	
Overweight	25.0 - 29.9	-	Increased
Obesity	30.0 - 34.9	I	High
Obesity	35.0 - 39.9	II	Very high
Extreme Obesity	> - 40	III	Extremely high

Fundus Examination:

Done by direct ophthalmoscopy, pupillary dilatation done by using 1% Tropicamide eye drop.

According to fundus changes, patients were divided into following groups:

- No signs of retinopathy.
- Grade I retinopathy.
- Grade II retinopathy.
- Grade III retinopathy.
- Grade IV retinopathy.

Laboratory investigations:

Urine Albumin:

- First voided midstream urine sample (5 ml) was collected.
- Urine analyzer COBAS U 411 was used to detect urinealbumin.

Patients were divided according to urine albumin readings,

- Nil, Trace, 1+, 2+, and 3+.
- Ultrasound of abdomen and pelvis:
- Done by ultrasound machine to assess the kidney size in hypertensive patients.

3. Observations and Results

The patients admitted in ICU and General wards in Pravara Rural Hospital, Loni with newly detected case of hypertension were studied from September 2018 to September 2020. In present study 225 patients were selected by random sampling procedure matching the inclusion and exclusion criteria with proformawas used to collect the data of the patients.

Among studied population 53.8% patients belonged to the age group of 40 - 60 years. Among studied population 62.2% patients were Male and 37.8 patients were Female. Among studied population 95.6 % patients had headache and giddiness.56 % patients had blurred vision. Among studied population 15.1% patients had family history of hypertension.

Among studied population 60 % patients had Stage I hypertension and 40% patients had Stage II hypertension. Among studied population 96.9 % patients had essential hypertension.

Table 1: Comparison of BMI and Albuminuria

			Urine Albumin		Total
			Absent	Present	
BMI	18.5 - 24.9	N	42	30	72
		%	58.3%	41.7%	100.0%
	25 - 29.9	N	54	92	146
		%	37.0%	63.0%	100.0%
	30 - 34.9	N	2	5	7
		%	28.6%	71.4%	100.0%
Total		N	98	127	225
		%	43.6%	56.4%	100.0%

P value = 0.008 (S)

In among studied population 63% patients had albuminuria (92 out of 146) who were overweight and 71.4% had albuminuria (5 out of 7) who were obese. Comparison of Albuminuria and BMI showed significant association. (P=0.008).

Table 2: Comparison of Stage of hypertension and Retinopathy

			Retinopathy		
			No	Yes	Total
Stage of hypertension	Stage I	N	74	61	135
		%	54.9%	45.1%	100.0%
	Stage II	N	34	56	90
		%	37.8%	62.2%	100.0%
Total		N	108	117	225
		%	48.0%	52.0%	100.0%

P value=0.01 (S)

Among studied population, in stage I hypertension 45.1% patients had retinopathy (61 out of 135). In stage II hypertension 62.2% (56 out of 90) patients had retinopathy. Comparison of stage of hypertension and Retinopathy showed significant association. (P=0.01).

Comparison of age and albuminuria was showed statistically non - significant results. Comparison of gender and albuminuria was showed statistically non - significant results. Among the studied population 55 % of male patients had Albuminuria and 58.9% female patients had Albuminuria.

Comparison of age and type of hypertension was showed statistically non - significant results.

Comparison of gender and type of hypertension was showed statistically non - significant results. Among the studied population 60.7 % of male patients had stage I hypertension.

Table 3: Comparison of Stage of hypertension and Albuminuria

			Albuminuria		Total
			Absent	Present	
Stage of hypertension	Stage I	N	70	65	135
		%	51.9%	48.1%	100.0%
	Stage II	N	28	62	90
		%	31.1%	68.9%	100.0%
Total		N	98	127	225
		%	43.6%	56.4%	100.0%

P value=0.001 (S)

Among studied population in Stage I hypertension 48.1% patients had albuminuria (65 out of 135) and in Stage II Hypertension 68.9% had albuminuria (62 out of 90). Comparison of Albuminuria and stage of hypertension showed significant association. (P=0.001).

Table 4: Comparison of Albuminuria and Retinopathy

			Retinopathy		
			No.	Yes	Total
Albuminuria	Absent	N	57	41	98
		%	58.1%	41.9%	100%
	Present	N	50	77	127
		%	39.4%	60.6%	100%
	Total	N	107	118	225
		%	47.6%	52.4%	100%

P value=0.005 (S)

Among studied population, 60.6% albuminuria patients have retinopathy. Comparison of Albuminuria and Retinopathy showed significant association. (P=0.001).

4. Discussion

In present study, total 225 patients were selected, among them 140 (62.2%) were male and 85 (37.8%) were female. The mean age of the patients was 59.99 years. The main age in the present study was comparable and near to most of other studies conducted by Ghai R et al (62.3 years) [9] and Agrawal B et al (57 years). [10]

Occurrence

In present study the occurrence ofan albuminuria in newly detected cases of hypertension was 56.4% (127 out of 225). Also, study conducted by BadigerS et al in 2012 showed the prevalence of albuminuria around 63% (63 patients out of 100). [11] Sabharwal RK (2012) [12] et al showed an occurrence of 33.3% (58 out of 174 cases). This difference could be due to most of the patients were from the Rural area and most of them were uneducated so didn't get medical attention on time and were diagnosed late.

The variability in prevalence may be explained by [13]

- Different values used to definealbuminuria.
- Different protocol used to evaluatealbuminuria.
- Difference in methods of urinecollection.
- Characteristics of studypopulation.

Relation of Age and Albuminuria:

In our study 37 (59.7%) patients had albuminuria between the age group of 40 – 50 years, similarly 34 (57.5%) between the age group of 50 – 60 years and 38 (63.3%) between the age group of 60 – 70 years. The occurrence ofalbuminuria according to the age groups in the present study was not significant. This could be because most of them do not seek medical care and do not get routine examination done on regular basis. In contrary to our study, Hitha B (2008) [14] et al study showed a higher incidence ofalbuminuria in patients with older age groups (p<0.001).

Relation of sex and albuminuria:

In present study, 50 (58.8%) female patient had albuminuria [50 out of 85] and 77 (55.0%) male patients had albuminuria [77 out of 140]. Sabharwal RK (2012) [12] et al showed an occurrence of albuminuria in 34% of male and 30.7% of female.

Relation of family history and hypertension:

In the present study occurrence of family history of hypertension was around 15.1%. This could be due most of the patients were uneducated so could not able to give proper family history.

Relation of symptoms and hypertension:

In the present study most of the patients had headache andgiddiness 215 (95.6%) as main symptom. So our study showed a significant association between symptoms and hypertension. Similarly, Ralapanawa U (2017) [15] et alshowed a significant association between symptoms and hypertension, also Meyer et al, [16] showed that ahigh percentage of hypertensive patients reported with symptoms, were associated to high blood pressure.

Relation of BMI and albuminuria:
In present study 146 patients were overweight, 63% patients showed (92 out of 146) a correlation with albuminuria. In present study albuminuria had significant correlation with higher BMI. Similarly, Hitha B (2012) [14] et al showed higher prevalence of albuminuria with higher BMI ($p<0.04$). Also Pedrinelli R (2003) [17] et al showed patients with high BMI had albuminuria. (p value=0.001).

Relation of Stage of Hypertension and Retinopathy:
In our study in stage, I hypertension 61, (45.1%) patients had retinopathy and in stage II hypertension, 56 (62.2%) patients had retinopathy. In our study the incidence of retinopathy was increased with the severity of the hypertension. Palatini et al. 's [18] study, showed 51% patients had hypertensive retinopathy. Contrary to our study BesharatiMR (2006) [19] et al found that 39.9% (85 out of 213) of patients had hypertensive retinopathy.

Relation of Age and Type of Hypertension:
In the present study, 218 (96.9%) patients diagnosed with essential hypertension and 7 (3.1%) patients diagnosed with secondary hypertension. In our study most of the patients were diagnosed with essential hypertension as compared to secondary hypertension so we were unable to compare the type hypertension with age groups. So, in present study there was no significant correlation according to age and the type of hypertension. (p value=0.19). Contrary to our studyMungreiphy NK (2011) [20] et al showed age was positively correlated both systolic and diastolic BP.

Relation of albuminuria and retinopathy:
In present study 77 (60.6%) patients had both albuminuria and retinopathy. The present study showed a statistically significant correlation between albuminuria and retinopathy. SimilarlyShantha GP (2009) [21] et al, in study of 180 elderly hypertensive patients, albuminuria had a strong association with hypertensive retinopathy ($p<0.001$) In 2002 Cerasola et al has observed a greater prevalence of retinopathy among those patients with albuminuria. [22]

5. Limitation of the Study

In this study only newly detected cases of hypertension were taken so relation ofalbuminuria and retinopathy with duration of hypertension could not be assessed.

6. Conclusions

- In this study, 30 (41.7%) out of 72 normal weight patients had albuminuria, 92 (63%) out of 146 overweight patients had albuminuria and 5 (71.4%) out of 7 obese patients had albuminuria. It was observed that as BMI of the patient increased, number of cases having albuminuria also increased. (P value = 0.008).
- 61 (45.1%) patients of stage I hypertension had retinopathy and 56 (62.2%) patients of stage II hypertension had retinopathy. It was observed that as the stage of the hypertension increased, number of cases having retinopathy also increased. (P value=0.01).
- 77 (60.6%) patients had both albuminuria and retinopathy. It was observed that albuminuria and retinopathy showed significant correlation in hypertensive patients. (P value= 0.005).
- Therefore in day today clinical practice screening for albuminuria and retinopathy should be considered as a part of initial work up in every newly detected hypertensive patients.

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