Research Article

PROSPECTIVE STUDY OF CARDIOMETABOLIC RISK FACTORS IN PATIENTS WITH PRE-HYPERTENSION

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ABSTRACT

Introduction: Prehypertension has been shown to be an early risk factor of cardiovascular disease (CVD). Prehypertension was defined as systolic blood pressure (BP) 120–139 mm Hg or diastolic BP 80–89 mm Hg .It is associated with many risk factors such as sympathetic overactivity, abnormal lipid profile, obesity and diabetes. Prevention of prehypertension is important goal for primary care patients. We investigated cardiometabolic risk factors in prehypertensive patients.

Material & Method: In this study 100 patients of prehypertension who were free of diabetes, hypertension and previous CVD. Three BP readings, Random blood glucose, glycated haemoglobin (HbA1c), body mass index (BMI),Waist Hip ratio,(WHR), Renal function Test, triglycerides, low-density lipoprotein (LDL) and high-density lipoprotein(HDL) cholesterol were examined as indicators of adverse cardiometabolic profile.

Result: Majority of study participants were males (67%) and aged between 41 to 60 years (72%), 5% individuals were more than 60 years. Majority (61%) patients were overweight and obese, overall mean basal heart rate of 82.50±10.37 beats/min.Family history of diabetes was seen in 35% & hypertension was seen in 34%. newly diagnosed diabetics were 6% ,there were 25% smokers and 21% alcoholics, higher level of blood glucose, HbA1c and BMI were significantly associated with prehypertension . In addition, higher levels of LDL cholesterol & triglycerides were significantly associated with prehypertension.

Conclusion: Age, smoking, family history, prediabetes and diabetes are important risk factors for prehypertension. Obesity, dyslipidemia and basal heart rate of more than 80 beats/min formed an important risk factors, as well as determinants of prehypertesion. Prehypertensives are at increased risk for cardiovascular disease and progression to hypertension, Screening for prehypertension and lifestyle modifications could potentially reduce the burden of CVD.

INTRODUCTION

Hypertension is an important modifiable risk factor for cardiovascular disease (CVD). Prehypertension, an earlier stage in the continuum of hypertension where preventative efforts have been shown to be effective in delaying or preventing the onsetof hypertension is associated with increased future risk of hypertension, diabetes mellitus, and CVD . Identifying and managing prehypertension have been recognized in national health policies as a priority to improve public health .Prehypertension is associated with adverse cardiometabolic risk profile even among apparently healthy populations.In the current study, we examined the association between cardiometabolic risk factors and prehypertension in an apparently healthy without diabetes mellitus, hypertension and preexisting CVD.

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Patients with Prehypertension have an increased risk of cardiovascular morbidity and mortality compared with patients who have normal blood pressure. This paper aimed to assess the cardiometabolic profile in Prehypertensive individuals and provide effective evidence of the benefits of treating prehypertensive patients in community

MATERIAL AND METHODS

Hundred cases prehypertensive subjects (individuals whose systolic blood pressure level are in the range of 120 to 139 mmHg or diastolic BP between 80 to 89 mmHg according to JNC -7 (2003) without previously diagnosed DM, HTN, CVD,attending the medicine OPD and ward at LLRM Medical college Meerut.

Inclusion Criteria

➢ Subjects with prehypertension
➢ Age >18

- Both sex
- Subjects who are cooperative / give written informed consent

Exclusion Criteria

- Age <18
- Pregnant women
- Uncooperative / Unable to provide informed written consent
- Patients on antihypertensive, hperlipidemic or antidiabetic drugs
- Previously diagnosed diabetes mellitus
- Previously diagnosed hypertensive
- Previously cardiovascular disease
- Ascites
- Febrile illness

Patients were subjected to detailed clinical examination and following parameters established.

(1) Age, (2) Sex (3) Height, Weight, (4) BMI ,(5) WHR (6), Heart rate
(7) Blood sugar (fasting and postprandial), (8) HBA1c.(9) Lipid profile

Besides these all routine investigations were done

RESULTS

In this study out of 100 prehypertensives, majority were males (67%) and aged between 41 to 50 years (39%) followed by 51 to 60 years (33%). Majority (61%) patients were overweight and obese, with overall mean basal heart rate of 82.50±10.37 beats/min and 6% were diabetics and 29% were prediabetics. Age, smoking, family history, prediabetes and diabetes are the important risk factors for prehypertension. The obesity, dyslipidemia and basal heart rate of more than 80 beats/min formed an important risk factors, as well as determinants of prehypertesion. Prehypertensives are at increased risk for cardiovascular disease and progression to hypertension.

Table 1 Distribution of patients according to blood pressure

| Bloodpressure	Patients	
(mmHg)	Number	Percentage
SBP		
120 –129	49	49
130 –139	51	51
DBP		
80 –84	64	64
85 –89	36	36
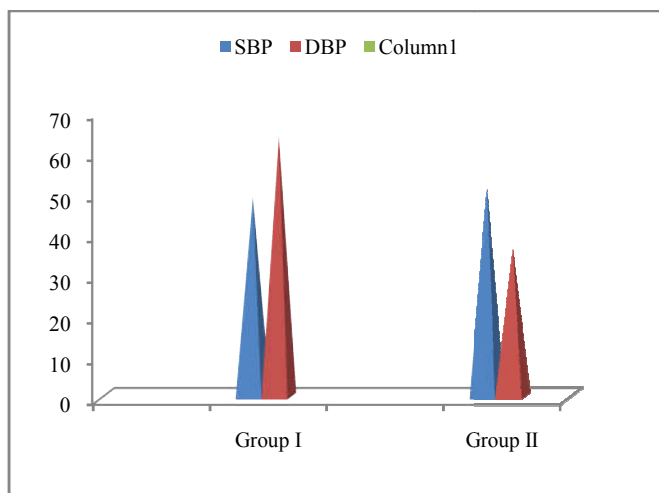
Fig 1 Distribution of patients according to blood pressure

In the present study, 49% patients had their SBP in the range of 120-129mm Hg, 51% had SBP from 130-139 mm Hg. Similarly DBP was 80-84 mm Hg in 64% and 85-89 mm Hg in 36% individuals.

Table 2 Association of age, clinical findings with prehypertension

| Variable	Group I * n = 46		Group II ** n = 54			
	Mean	SD	Mean	SD	t	P-value
Age	44.89	9.87	48.46	9.39	1.851	0.067
BMI	24.6	3.84	27.01	3.71	4.639	<0.001
WHR	0.83	0.05	0.86	0.04	3.332	0.001
Basal HR	80.26	9.87	84.4	10.48	2.022	0.046

*Blood pressure 120 to 129 / 80 to 84 mm Hg ,** Blood pressure 130 to 139 / 85 to 89 mm Hg
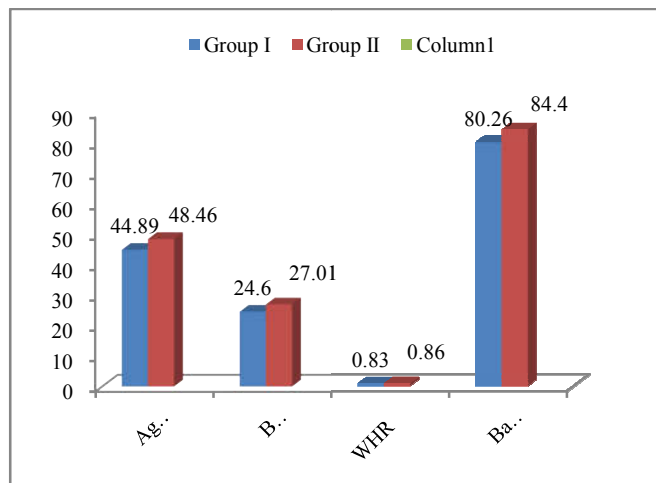
Fig 2 Association of age and clinical findings with prehypertension

**Table 3** Association of laboratory profile with prehypertension

Variable	Group I * n = 46		Group II ** n = 54			
	Mean	SD	Mean	SD	t	P-value
GFR	121	26.56	116.72	29.92	0.751	0.455
Cholesterol	178.73	34.23	203.01	42.00	3.133	0.002
LDL	106.93	35.03	123.03	41.21	2.084	0.040
HDL	46.32	20.03	45	18.96	0.338	0.736
TG	131.28	64.24	178.35	136.29	2.260	0.027
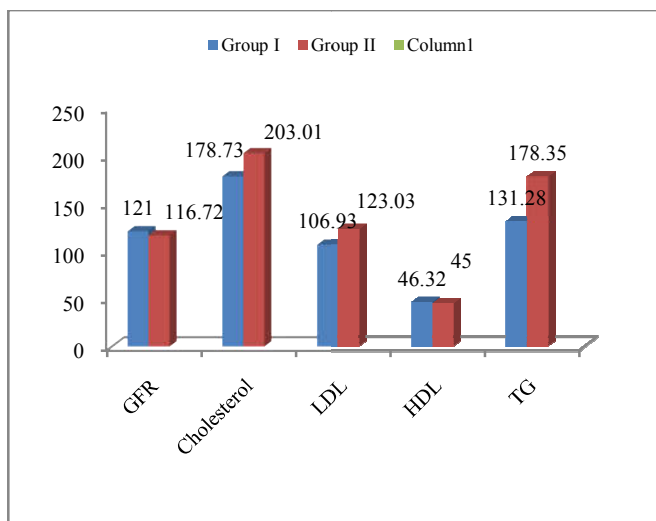
Fig 3 Association of laboratory profile with prehypertension

Table 4 Comparison of clinical findings in Diabetic, Prediabetic and Nondiabetic prehypertensive

| Parameters	DM		PreDiabetes		NonDiabetics		pvalue
	Mean	SD	Mean	SD	Mean	SD	
Basal heartrate	85.79	9.42	84.9	11.04	79.71	9.98	a0.762 b0.010 c 0.056
BMI	26.09	3.89	26.82	4.17	25.43	3.88	a0.531 b0.472 c 0.118
WHR	0.85	0.05	0.85	0.04	0.84	0.06	a1.000 b0.456 c 0.413
MeanSBP	131.2	5.83	132.6	4.87	128.2	5.53	a0.377 b0.026 c 0.002
MeanDBP	84.75	3.87	84.5	4.01	82.39	3.57	a0.827 b0.008 c 0.031
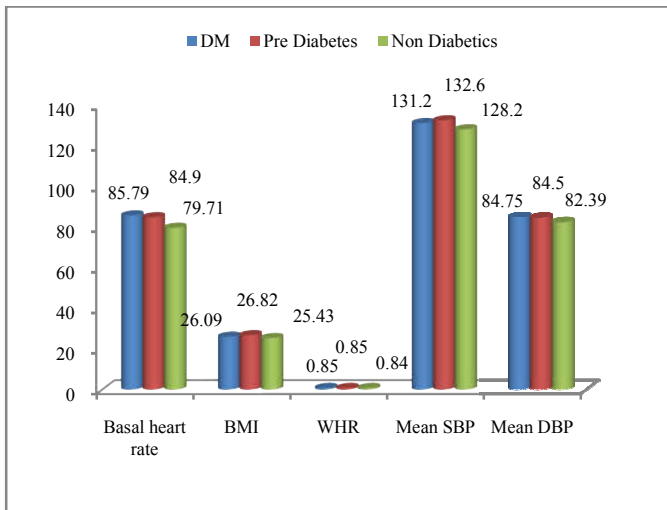
Fig 4 Comparison of clinical findings in Diabetic, Prediabetic and Nondiabetic prehypertensive

Table 5 Comparison of laboratory profile in Diabetic, Prediabetic and Nondiabetic prehypertensive

Parameters	DM		PreDiabetes		NonDiabetics		pvalue
	Mean	SD	Mean	SD	Mean	SD	
GFR	111.7	32.67	120.8	23.1	121.7	27.64	a0.282 b0.154 c 0.896
Cholesterol	191.3	51.02	187	37.7	194.1	35.06	a0.747 b0.797 c 0.447
LDL	119	45.01	114.3	39.65	114.3	36.09	a0.705 b0.614 c 1.0
HDL	41.39	7.52	44.1	14.47	48.55	24.69	a0.440 b0.060 c 0.345
TG	157.5	78.66	198.00	199.70	139.3	64.76	a0.387 b0.272 c 0.201

a=Diabetic vsprediabetic ,b= Diabetic vs non diabetic ,c= Prediabeticvs non diabetic
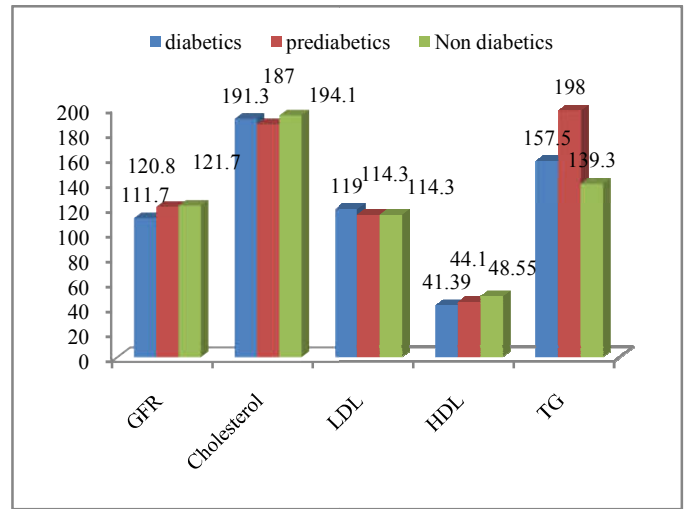
Fig 5 Comparison of laboratory profile in Diabetic,Prediabetic and Nondiabeticprehypertensive

DISCUSSION

In our study there were 67% males and 33% females with a majority of patients being in the age group of 41 to 60 years (72%), 5% individuals were more than 60 years. The prevalence of prehypertension decreased in the above 60 years age group probably because of higher prevalence of hypertension in older age group. Family history of diabetes& hypertension was seen in 35% & 34 % respectively, there were 25% smokers and 21% alcoholics, the mean BMI was 25.91 ± 9.35 kg/m^{2}and 61% patients were either over weight (46%) or obese (15%). This may suggest family history, smoking & obesity are a risk factor for prehypertension.

In our study mean Basal Heart Rate was 82.50 ± 10.37 beats/min and 54% individuals were having their basal heart rate more than 80 beats/min. These may suggest a cause/effect relationship of basal heart rate and prehypertension and may propose that increased basal heart rate is a risk factor for prehypertension. This may also implicate common etiology that is, sympathetic overactivity, hormonal mechanisms and psychoneuronal processes that reflect increase stress/anxiety for both, increased basal heart rate and prehypertension. In this study diabetes and prediabetes was (6%) and (29%) respectively & 32% subjects were having serum cholesterol more than 200 mg/dL, LDL-C (more than 130 mg/dL) was seen in 31% and hypertriglyceridemia (TG more than 150 mg/dL) was seen in 37% individuals prehypertensives. The HDL-C was lower than 40 mg/dL in 54% However this explains diabetes as well as prediabetes &dyslipedemia are risk factors for prehypertension. Based on risk factors like obesity, diabetes and dyslipidemia it is suggested that metabolic syndrome as a whole is a risk factor for prehypertension. Glomerular filtration rate, a marker of target organ damage was less than 90 ml/min in 17% of prehypertensives. Out of them 9% were diabetics, 2% prediabetics and 6% were non diabetics. this data indicates that non diabetic prehypertensives are also at risk for development of target organ damage. Further prehypertensvies were classified in to two groups. Group I with BP 120-129/80-84 mm Hg and Group II with BP 130-139/85-89 mm Hg and compared both the groups. Mean age in group II was 48.46 ± 9.39 years, higher than group I (44.89 ± 9.87 years) again indicating that prehypertension increases with age

.Similarly BMI and WHR and dyslipidemia also increased from Group I to Group II indicating both as a risk factor and helps us stating the fact that prehypertension is a marker of deranged cardiometabolic profile. High prevalence of diabetes mellitus and hypercholesteremia is seen in Group II in this study. In this study mean basal heart rate was more in group II (84.4±10.48 beats/min) compared to Group I (80.26±9.87 beats/min) &Mean basal heart rate statistically increased form nondiabetic (79.71±9.98 beats/min) to prediabetic (84.9±11.04 beats/min) and further to diabetic (85.79±9.42 beats/min) (p=0.010).Mean SBP and DBP was significantly higher in diabetics and prediabetics than non diabetics indicating diabetes as well as prediabetes as a risk factor for prehypertension and other metabolic parameters like lipid profile, BMI and WHR did not vary much between three groups. There was not much difference between diabetic and predibetic groups in all aspects and both groups should be considered equally as important risk factor for CVD and progression to HTN.

CONCLUSION

Age, smoking, family history, prediabetes and diabetes are important risk factors for prehypertension. Obesity, dyslipidemia and basal heart rate of more than 80 beats/min formed an important risk factors, as well as determinants of prehypertesion. Prehypertensives are at increased risk for cardiovascular disease and progression to hypertension,Screening for prehypertension and lifestyle modifications could potentially reduce the burden of CVD.

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