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CORRELATION BETWEEN INTER ARM BLOOD PRESSURE DIFFERENCE AND DIABETIC RETINOPATHY IN DIABETES PATIENT

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Keywords:
Diabetes Mellitus, Diabetic Retinopathy, Inter Arm Blood Pressure Difference

Abstract

Objectives- To estimate the difference in inter arm blood pressure in diabetes patient and to establish the association between the inter arm blood pressure difference in diabetes patient with diabetic retinopathy. Design: observational study Setting: Conducted in the Department of General Medicine at Sri Devaraj Urs medical college, Kolar, Karnataka. Subjects: 98 diabetic subjects were studied and were evaluated for inter arm blood pressure difference and diabetic retinopathy. Results: Out of 98 subjects diabetic retinopathy was present in 59(60.2%) subjects and remaining 39(39.8%) subjects didn't had diabetic retinopathy. 72(73.47%) subjects had difference in inter arm systolic blood pressure <10mmhg considered as group 1 and 26(26.53%) subjects had difference in inter arm systolic blood pressure >10mmhg considered as group 2. There was statistically significant difference found between two groups with respect to Severity of Diabetic retinopathy. Conclusion: Inter arm differences in systolic blood pressure are significantly associated with diabetic retinopathy and its severity.

Introduction

Diabetes mellitus is an "Iceberg disease". Diabetes mellitus is accepted as a worldwide epidemic with an estimated increase in prevalence from 2.8% in 2000 to 4.4% by 2030[1.]

Diabetes mellitus is the leading cause of blindness between the ages of 20 and 74. Blindness in Diabetes is primarily the result of progressive diabetic retinopathy and clinically significant macular edema. While it has been well established that intensive blood glucose control can lower the risk of microvascular complications from diabetes, the pathophysiology of retinopathy progression is not completely understood. [2-4]

A systolic difference in blood pressures between arms is associated with peripheral arterial disease, cerebrovascular disease, and increased cardiovascular and all-cause mortality .Studies that have examined the interarm difference in people with diabetes, who are also at elevated cardiovascular risk, report a prevalence of a systolic difference ≥10 mmHg between arms in type 2 diabetes of about 9–10%. [5]A systolic inter-arm difference ≥10 mmHg was observed in 10% of patients with diabetes, a diastolic inter-arm difference ≥5 mmHg in 29%, and in others a diastolic inter-arm difference ≥10 mmHg was observed in 3% of patients with diabetes.[6,7]

The aim of the study present was to evaluate the role of interarm blood pressure difference and its correlation as a predictor of diabetic retinopathy in diabetes patient in the Indian population as there are no known studies of similar kind which have been done in Indian population.

Objectives-.

1. To estimate the difference in inter arm blood pressure in diabetes patient.
2. To establish the association between the inter arm blood pressure difference in diabetes patient with diabetic retinopathy.

Materials & Methods

Study setting:-Study was conducted in the Department of General Medicine at Sri DevarajUrs medical college, Kolar, Karnataka.

Source of data: - Type 2 Diabetic patient attending OPD and those admitted in R. L. Jalappa hospital.

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Study design: -observational study.
Sample size: - 98 subjects
Study duration: - 9months.
Method of collecting data

Patients attending R.L.JALAPPA hospital who fulfil the inclusion/exclusion criteria were taken in to study after obtaining a written informed consent

Inclusion criteria-
1. Diabetic patients older than 18 years of age.

Exclusion criteria-
1. Patient younger than 18 years.
2. Patients with cataract.
3. Patients with absence of one limb.
4. Patients with glaucoma.
5. Patients with shallow anterior chamber.

Patients attending R.L.JALAPPA hospital who fulfil the inclusion/exclusion criteria were taken in to study after obtaining a written informed consent. Demographic data, history, clinical examination and details of investigation was recorded in study Performa and under aseptic condition 10 ml of blood was drawn from the brachial vein and subjected to the investigations like HbA1c.

And after taking the proper consent of the patient the pupils was dilated using 2 drops of 1% tropicamide. And after 10-15 minutes the fundus was examined using WelchAllyn 12870-BLK direct ophthalmoscope and then the findings were recorded on the paper.

Blood pressure was monitored using *Diamond Mercurial* Blood Pressure Apparatus(mercury based sphygmomanometer) after resting for 5 mins in supine position in both right and left arm of the patient.

Statistical analysis
Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test or Fischer's exact test (for 2x2 tables only) was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Independent t test was used as test of significance to identify the mean difference between two quantitative variables. P value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results
In our study we have included 98 diabetic patients. Among 98 subjects 52(53.06%) subjects were female and 46(46.94%) subjects were male.

In our study out of 98 subjects diabetic retinopathy was present in 59(60.2%) subjects and remaining 39(39.8%) subjects didn't had diabetic retinopathy.

Minimum age was 35yrs and maximum was 87yrs with mean age was 58.38 $\pm$ 12.79yrs.

Table 1:- Comparison of various parameters of the subjects according Interarm difference in systolic blood pressure(SBP)

	Inter arm difference in SBP	P value

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		<10mmhg	≥10mmhg	
Age in years		53±10yrs	73±7yrs	<0.001
HbA1C level		7.54 ±0.68	9.07 ±0.77	<0.001
Sex	Female	40	12	0.494
	Male	32	14	
Diabetic retinopathy	Absent	39	0	<0.001
	Present	33	26	
Severity of Diabetic retinopathy	NO BDR	39	0	<0.001
	MILD NPDR	25	0	
	MODERATE NPDR	7	6	
	SEVERE NPDR	1	14	
	PDR	0	6	

BDR- background diabetic retinopathy, NPDR-non proliferative diabetic retinopathy, PDR-proliferative diabetic retinopathy

72(73.47%) subjects had difference in inter arm systolic blood pressure<10mmhg and 26(26.53%) subjects had difference in inter arm systolic blood pressure≥10mmhg.

Group 1 which consists of subjects who had difference in inter arm systolic blood pressure<10mmhg and group 2 which consists of subjects who had difference in inter arm systolic blood pressure≥10mmhg.

Mean age in group 1 was 53±10yrs and in group 2 was 73±7yrs, there was statistically significant difference found between two groups with respect to age.

Mean HbA1C level in group 1 was 7.54 ±0.68and in group 2 was 9.07 ±0.77, there was statistically significant difference found between two groups with respect to HbA1C level.

There was no statistically significant difference found between two groups with respect to sex. In subjects who didn't had Diabetic retinopathy all had Interarm difference in SBP less than <10mmhg. There was a statistically significant difference found between two groups with respect toDiabetic retinopathy. There was statistically significant difference found between two groups with respect to Severity of Diabetic retinopathy.

Table 2:- Comparison of various parameters of the subjects according Interarm difference in diastolic blood pressure(DBP)

	Interarm difference in DBP		P value
	<10mmhg	≥10mmhg	
Age in years	58±13yrs	68±9yrs	0.057
HbA1C level	7.9 ±0.98	8.67 ±0.57	0.064

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Sex	Female	48	4	0.681
	Male	44	2	
Diabetic retinopathy	Absent	39	0	0.078
	Present	53	6	
Severity of Diabetic retinopathy	NO BDR	39	0	0.004
	MILD NPDR	25	0	
	MODERATE NPDR	11	2	
	SEVERE NPDR	13	2	
	PDR	4	2	

BDR- background diabetic retinopathy, NPDR-non proliferative diabetic retinopathy, PDR-proliferative diabetic retinopathy.

92(93.88%) subjects had difference in inter arm diastolic blood pressure<10mmhg and 6(6.12%) subjects had difference in inter arm diastolic blood pressure≥10mmhg.

Group 1 which consists of subjects who had had difference in inter arm diastolic blood pressure<10mmhg and group 2 which consists of subjects who had difference in inter arm diastolic blood pressure≥10mmhg.

Mean age in group 1 was 58±13yrs and in group 2 was 68±9yrs, there was no statistically significant difference found between two groups with respect to age.

Mean HbA1C level in group 1 was 77.9 ±0.98 and in group 2 was 8.67 ±0.57, there was no statistically significant difference found between two groups with respect to HbA1C level.

There was no statistically significant difference found between two groups with respect to sex. In subjects who didn't had Diabetic retinopathy all had Interarm difference in DBP less than <10mmhg.There was no statistically significant difference found between two group with respect toDiabetic retinopathy.

There was statistically significant difference found between two groups with respect to Severity of Diabetic retinopathy

Discussion

In our study there was statistically significant difference found between subjects with <10mmhg inter arm systolic BP and subjects with ≥ 10mmhg inter arm systolic BPwith respect to age, HbA1C level. There was no statistically significant difference found between subjects with <10mmhg inter arm systolic BP and subjects with ≥ 10mmhg inter arm systolic BPwith respect to sex.

A study done by Clark CE et al [7]Cross-sectional associations of interarm difference with vascular morbidity were examined for the diabetic participants. Baseline demographics for subjects with and without systolic interarm differences≥15 mmHg were similar; subjects with a difference≥10 mmHg showed differences in age, sex distribution, smoking habits

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In our study there was a statistically significant difference found between subjects with <10mmhg inter arm systolic BP and subjects with ≥ 10mmhg inter arm systolic BP with respect toDiabetic retinopathy. There was statistically significant difference found between subjects with <10mmhg inter arm systolic BP and subjects with ≥ 10mmhg inter arm systolic BP with respect to Severity of Diabetic retinopathy.

A study done by Clark CE et al [7]A systolic inter arm difference >15 mmHg was associated with the presence of diabetic retinopathy.

A study done by Spannella F[8] et al Diabetic patients with systolic IAD ≥5 and systolic IAD ≥10 mm Hg showed an increased risk of having vascular damage.
In a study done by Tanaka Y et al [5] the inter arm difference was higher in the patients with proliferative diabetic retinopathy than in those with no diabetic retinopathy (P value <0.0001) which was similar to our finding.

Okada et al.[22] demonstrated that an inter arm difference in SBP and a difference between the lower limbs could be a novel risk marker for diabetic nephropathy in patients with type 2 diabetes. Together, these findings indicate that the inter arm difference might correlate with micro- and macrovascular complications in patients with type 2 diabetes.

The present study has several limitations. First, since our study had an observational study design, the identified associations do not necessarily confirm causation. Furthermore, due to the absence of randomization from the general population, generalization of our findings is restricted

Conclusion
Interarm differences in systolic blood pressure are significantly associated with diabetic retinopathy and its severity. We recommend routine measurement of interarm blood pressure differences to improve diagnostic and prognostic stratification of diabetic patients.

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Declarations
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