

A CORRELATION ALSTUDY BETWEEN RESISTIVE INDEX AND BIOCHEMICAL PARAMETERSIN THE EVALUATION OF DIABETIC NEPHROPATHY IN TYPE-II DIABETES MELLITUS PATIENTS.

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ABSTRACT:

Diabetic nephropathy is one of the common causes of native kidney dysfunction. Total number of 50 subjects will be enrolled in this present cross sectional study in the department of General Medicine, Chengalpattu medical college and hospital, in collaboration of Radiology and Nephrology of the same institution during two years aim to evaluate the diagnostic usefulness of renal resistive index by duplex Doppler ultrasonography for detection of renal dysfunction in diabetic patients. Clinically diagnosed diabetic patients having diabetic nephropathy are taken as a sample. The results are that there is a strong positive association between microalbuminuria and resistive index. A positive correlation ($r=0.581$, $p<0.01$) was found between resistive index with serum creatinine and albuminuria which indicates deterioration of renal function, i.e. progression of the disease. In previous study it was shown that the correlation between serum creatinine and RI values in diabetic nephropathy to be ($r=0.84$) indicating that RI may be useful as a renal prognostic marker. In this regard, even if renal function is well preserved at baseline when RI is greater, we should observe these patients carefully in the follow-up period because they have significant vascular lesions

INTRODUCTION:

Diabetic nephropathy is one of the common causes of native kidney dysfunction and is the commonest cause of end-stage renal disease in the United States. Renal changes that are associated with diabetes mellitus are complex, ranging from early hyper filtration with an increased glomerular filtration rate (GFR) to late nephron sclerosis and fibrosis with azotemia. Presently, radiologic imaging doesn't have an important role in diagnosing or follow-up of possible diabetic nephropathy. With conventional ultrasonography (US), renal enlargement (in the early stages of disease) and renal parenchymal loss (in the later stages of disease) have been described, but these observations have limited clinical sensitivity and specificity. Renal duplex Doppler USG is useful, both to detect renal dysfunction before obtaining results of conventional clinical and laboratory tests and to predict subsequent renal status.

AIM AND OBJECTIVES:

Objective of the study is to evaluate the diagnostic usefulness of renal resistive index by

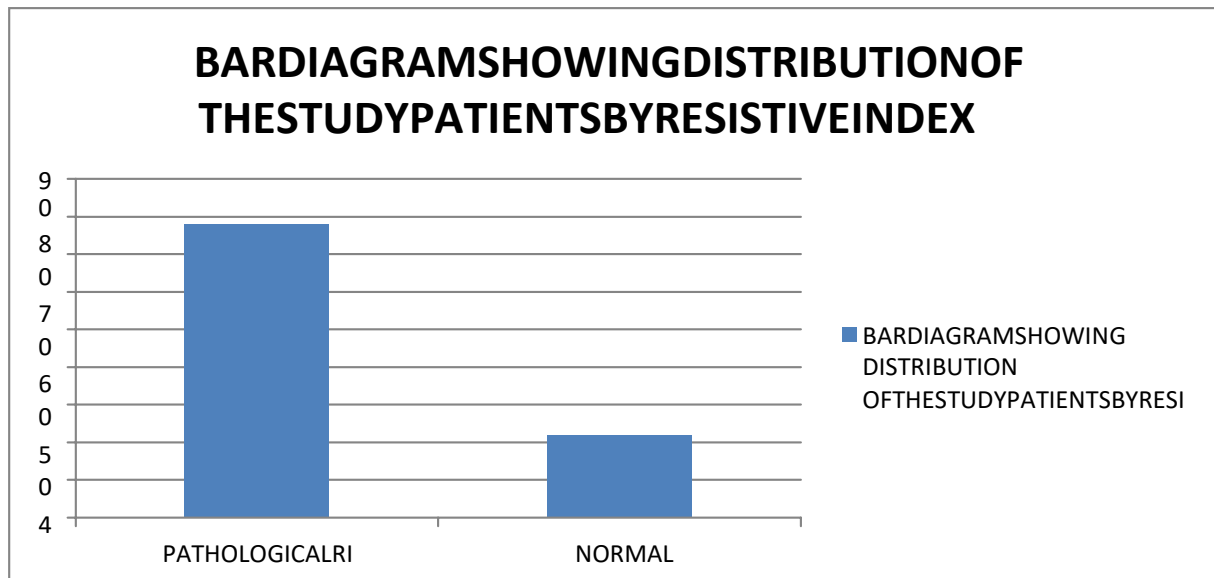
duplex Doppler ultrasonography for detection of renal dysfunction in diabetic patients and also to compare renal RI as a diagnostic tool for diagnosis of diabetic nephropathy with the biochemical diagnosis.

MATERIALS AND METHODS:

Total number of 50 subjects will be enrolled in this present cross sectional study in the department of General Medicine, Chengalpattu medical college and hospital, in collaboration of Radiology and Nephrology of the same institution during two years aim to evaluate the diagnostic usefulness of renal resistive index by duplex Doppler ultrasonography for detection of renal dysfunction in diabetic patients. Clinically diagnosed diabetic patients having diabetic nephropathy are taken as a sample. After informing all the necessary information regarding the research study, data will be collected in a pre- designed structured data collection sheet. Before performing ultrasonography, proper counselling and reassurance to the patient regarding the procedure will be done. First of all, kidneys will be visualized with real time B-scan and then intrarenal arteries are examined by duplex Doppler ultrasound. At least three measurements of intrarenal arteries will be taken in upper, mid and lower intrarenal arteries of each kidney. The RI value will be determined by preset formula incorporated in the machine. Only those showing the highest RI values obtained with duplex Doppler will be taken into account

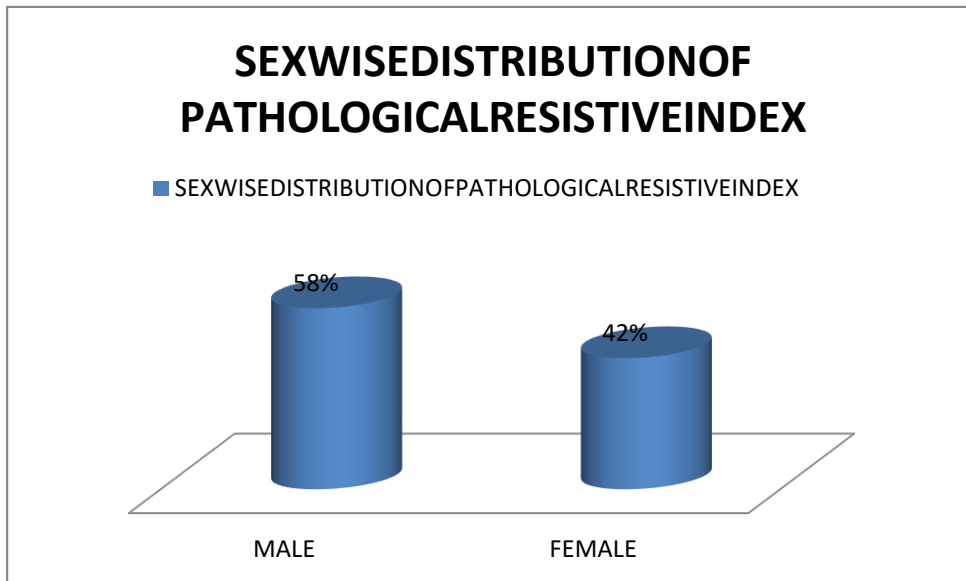
RESULTS:

FIGURE-1: BAR DIAGRAM SHOWING DISTRIBUTION OF THE STUDY PATIENTS BY RESISTIVE INDEX



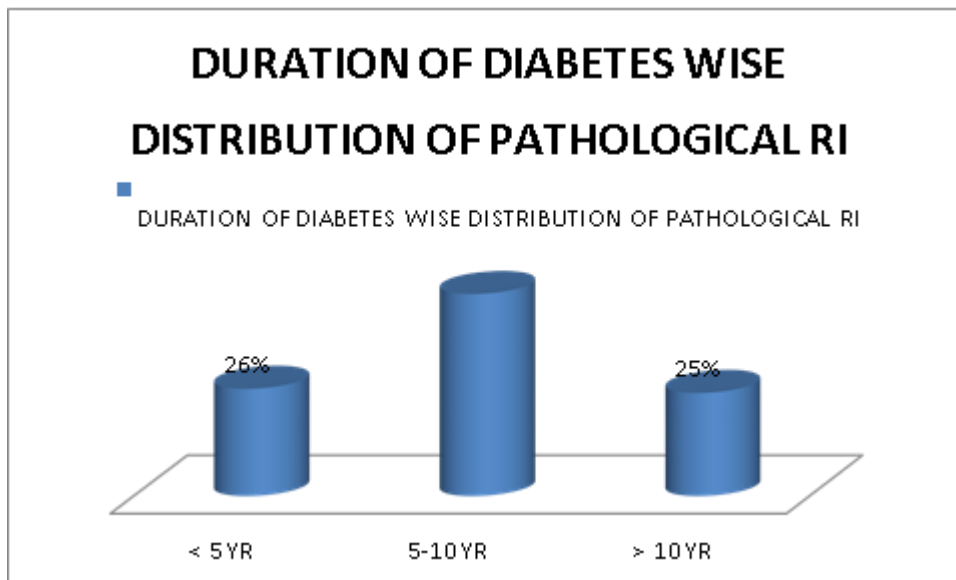
Among our study population, 78 % shows pathological resistive index and 22 % shows Normal resistive index.

FIGURE- 2: SEX WISE DISTRIBUTION OF PATHOLOGICAL RESISTIVE INDEX



Our study group totally consists of 100 samples, 56 were in Males among them 45(58%) had pathological RI. 44 were in Females among them 33(42%) had pathological RI.

FIGURE 3:



Mean duration of diabetes in our study – 3 yrs.

Among our study population of 100, there were 28,45,27 with duration of diabetes of <5years, 5-10years and >10years respectively and among them 20(26%), 38(49%), 20(25%) had pathological RI respectively.

TABLE 1:
USG WISE DISTRIBUTION OF PATHOLOGICAL RI.

USG FINDING REGARDING DKD	PATHOLOGICAL RI(n=78)	%
PRESENT	40	51
ABSENT	38	49

Among our study group, association between pathological RI and USG regarding DKD were 51 %.

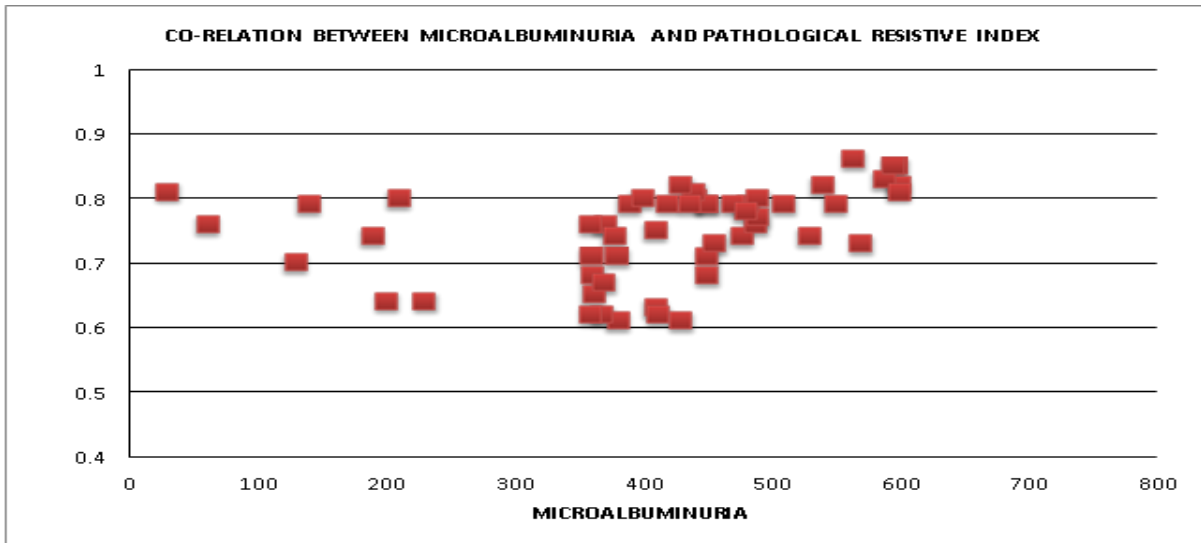
TABLE 2:DIABETIC RETINOPATHY WISE DISTRIBUTION OF RESISTIVE INDEX

	PATHOLOGICAL RI	NORMAL RI
N	78	22
DIABETIC RETINOPATHY	65	11
%	83	50

Among 100 patients, 78 patients were in pathological RI among them 65(83%) had diabetic retinopathy.22 patients were in normal RI among them 11(50%) had diabetic retinopathy.

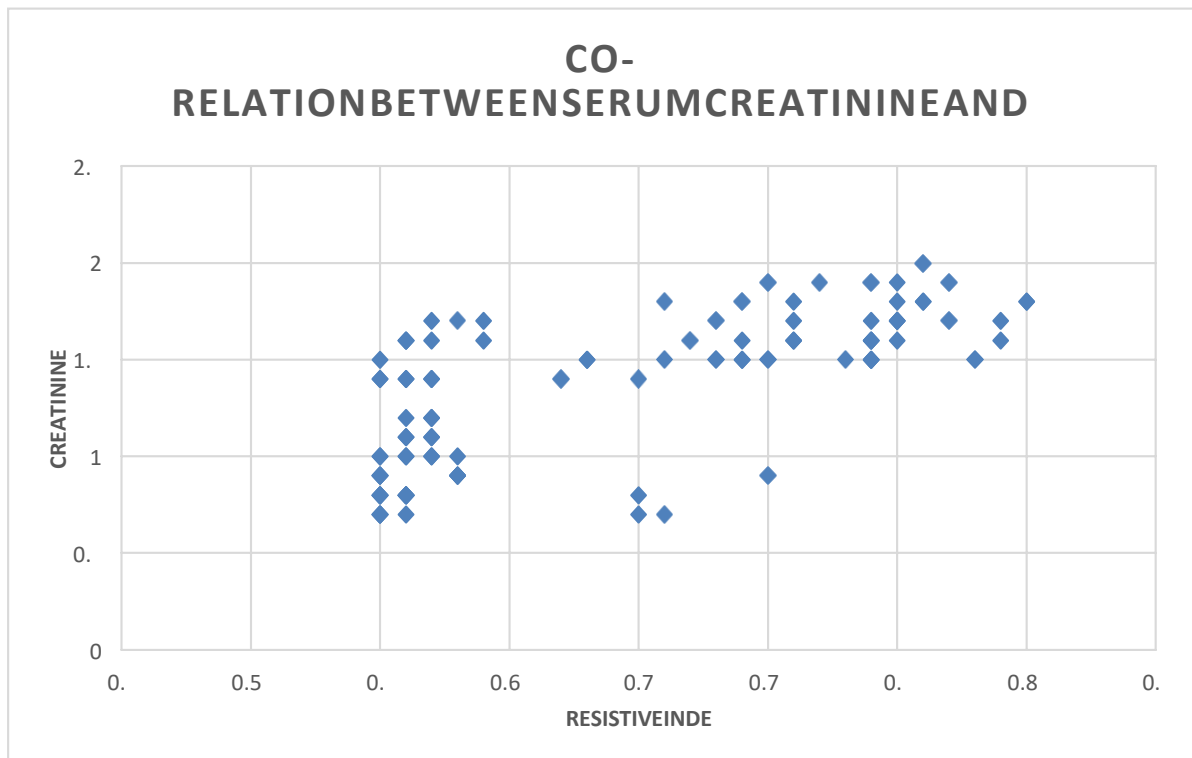
There is a strong positive association between diabetic retinopathy and pathological resistive index.

FIGURE-3: CO-RELATION BETWEEN MICROALBUMINURIA AND RESISTIVE INDEX:



This scatter diagram showing positive correlation between micro albuminuria and Resistive Index (P value 0.0007153, $p < 0.001$).

FIGURE-5: CO-RELATION BETWEEN SERUM CREATININE AND RESISTIVE INDEX:



This scatter diagram showing positive correlation between Serum creatinine and Resistive Index (P value 0.0007229, $p < 0.001$).

DISCUSSION: Diabetic nephropathy is a frequent micro vascular complication of Diabetes mellitus. Early functional and structural abnormalities may be present a few years after the onset of the disease. In these last decades, Doppler ultrasonography has provided an easily applicable and noninvasive method for investigating renal hemodynamic. The renal resistive index reflects intracranial vascular resistance. The mechanisms for increased RI values in patients with decreased glomerular function is unknown. In our current study it was observed that majority of the patients were in sixth decade with the mean age of 50.5 ± 7.6 years, ranging from 38 to 65 years. A recent study has shown in their series, the mean age of patients with diabetes as 57.4 ± 7.6 years.

In another study it was showed the mean (\pm SD) age of the patients having diabetes as 55.9 ± 12.8 years which is comparable with the current study. Researchers found the mean age of the patients with diabetes 47.8 ± 11.34 years. Our study group totally consists of 100 samples, 56 were in Males among them 45(58%) had pathological RI. 44 were in Females among them 33(42%) had pathological RI. In this present study it was observed that male was predominant in both groups, where male was found as 56%. Among our study population of 100, there were 28,45,27 with duration of diabetes of <5years, 5-10years and >10years respectively and among them 20(26%), 38(49%), 20(25%) had pathological RI respectively. Mean duration of diabetes in our study – 3 yrs.

Among our study population, 78 % shows pathological resistive index and 22 % shows Normal resistive index. Mean resistive index was found to be 0.71 ± 0.04 and varied from 0.60 to 0.82. Similarly, it was found RI significantly higher in diabetic patients (0.69 ± 0.05). In another study it was showed the mean RI value (0.69 ± 0.1) in patients with diabetes. Similar results about the resistive index were also made by other researchers. In another study it was seen that mean RI of 0.64 ± 0.09 in 23 patients with early diabetic nephropathy. Patients with established nephropathy had a mean RI of 0.83 ± 0.11 . Spomenka et al. showed that Doppler ultrasound can help in early diagnosis of diabetic nephropathy by measuring intra-renal artery resistance index and found a direct relationship between intra-renal RI and diabetic nephropathy which was consistent with our study. Their results indicate that the increased RI of the renal arteries is associated with the severity of systemic

atherosclerosis. Among 100 patients, 82 were in microalbuminuria among them 66(85%) had pathological RI. 18 were in without microalbuminuria among them 12(15%) had pathological RI. There is a strong positive association between microalbuminuria and resistive index.

In our study 100 patients, 60 were in increased creatinine among them 42(54%) had pathological RI. 40 were in normal creatinine among them 36(46%) had pathological RI. A positive correlation ($r=0.581$, $p < 0.01$) was found between resistive index with serum creatinine and albuminuria which indicates deterioration of renal function, i.e. progression of the disease. In previous study it was shown that the correlation between serum creatinine and RI values in diabetic nephropathy to be ($r=0.84$). Similarly, study found correlation between the two to be $R^2=0.67$ ($p < 0.001$).

CONCLUSION:

The usefulness of duplex Doppler Ultrasonography or Resistive Index in patients with renal disease seems to be underestimated. RI may be useful as a renal prognostic marker. In a long course of renal disease, renal outcome may be affected by various factors, such as infection, surgical stress, radiographic contrast medium, or nephrotoxic drugs.

The readiness and safety of duplex Doppler may enable us to examine renal exacerbation in the proper timing and lead to effective treatment. In this regard, even if renal function is well preserved at baseline when RI is greater, we should observe these patients carefully in the follow-up period because they have significant vascular lesions. Moreover, RI may be one of the clinical parameters that should be checked regularly in an outpatient clinic.

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