



## ***Ischemia Modified Albumin as a Marker of Chronic Kidney Disease in Diabetes Patients on Dialysis.***

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### **Introduction**

Biomarkers have been in place to detect early and treatable stages of kidney infections however, chronic stages may present with alternative biomolecules modifications that may marks the intensity and fatal threat of the kidney disease. The aim of this study was to evaluate the levels of Ischemia Modified Albumin as a ‘new biomarker’ for CKD patients in dialysis, correlates it with the typical parameters of kidney functional test of creatinine, albumin, globulin, urea, total protein, random blood sugar (RBS) and independent variable of age and gender. In addition, the also study was aimed at establishing to what extent is the IMA level influenced by the above parameters.

### **Materials and Methodology**

#### **1. Chemicals used**

- Cobalt chloride
- Dithiothreitol

Sodium chloride, Others, distilled water, micropipette and tips, sample and other bench apparatus for solid weighing liquid measurements, spectrophotometer and Automated ‘Vitro 5600 Diagnostic’ machine.

### **Sample collection.**

Ethical clearance for the study was issued by the ethical committee of Yenapoya Medical College in Mangalore, Karnataka-India. Blood samples from 20 patients were collected by venipuncture in plain tubes and centrifuged immediately at 3000xg for 10mins. The serum was collected and kept in the fridge at 4°C until use. The sample from patients were collected on separate days depending on availability and consent. Using the same technics serum sample was prepared from 6 healthy volunteers as control. The age of the patients ranges from 23-73 years (8 females and 12 males).

### **Exclusion Criteria.**

The study excluded patients with;

- cardiovascular disease.
- recent significant injury (both internal and external)
- alcoholism.
- Smoking.
- viral hepatitis.
- HIV.

Before collection of blood sample, patients

were avoided from any form of vigorous muscular exercise for at least 6 hours prior to the sample collection.

### Materials and Reagents

- Cobalt chloride (1g/l): Analytical quality cobalt chloride was purchased from Sri Durga laboratory supplies, Chillimbi Main Road, Mangalore - 575006.

- Dithiothreitol (1.5g/l): Analytical quality Dithiothreitol was purchased from Sri Durga laboratory supplies, Chillimbi Main Road, Mangalore - 575006.

Sodium chloride (Normal saline was purchased from Yenagoa medical store).

### Reagent preparations

- Cobalt chloride solution(1g/l): 0.1g of cobalt chloride was dissolved in 100 ml of distilled water. The solution was kept in brown bottle in dark till use.

- Dithiothreitol (1.5g/l): 0.15g of DDT was dissolved in 100ml of distilled water. The solution was kept in brown bottle in dark till use.

### Procedure for Cobalt Binding Test Assay.

- To 200µl of serum, 50µl of cobalt chloride solution was added followed by vigorous mixing and incubated for 2 minutes in dark at room temperature.

- 50µl of Dithiothreitol solution was added followed by vigorous mixing and 2 minutes of incubation at room temperature in dark.

- The blank was prepared similarly by excluding Dithiothreitol. The solution was read in spectrophotometer at 470nm and the IMA values were recorded in Absorbance Units (ABSU).
- The same procedure was repeated for the control sample

### Table of Results

S/ No	Age	sex	RBS (Mg/dl)	Creatinine (Mg/dl)	IMA (ABSU)
1	73	M	107	7.6	0.188
2	65	M	415	3.7	0.195
3	38	M	193	10.4	0.437
4	73	F	95	8.7	0.161
5	51	F	74	4.5	0.234
6	48	F	196	0.8	0.162
7	49	M	79	5.1	0.123
8	55	M	110	12.7	0.197
9	55	M	94	1.5	0.183
10	46	M	36	9.1	0.185
11	56	M	127	0.6	0.344
12	61	F	134	1.4	0.553
13	57	M	93	2.3	0.196
14	55	M	337	9.7	0.168

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15	41	F	186	12.9	0.258
16	48	F	125	7.1	0.277
17	58	F	225	2.1	0.337
18	25	M	123	15.6	0.178
19	59	M	102	9.8	0.415
20	23	F	121	5.5	0.178

Sl/No	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Urea (mg/dl)
1	6.4	3.2	3.2	68
2	6.3	4.2	3.0	53
3	7.2	3.4	3.4	175
4	6.5	3.0	2.7	98
5	6.5	3.3	3.3	48
6	7.5	4.0	3.5	196
7	7.0	3.5	3.9	70
8	7.8	3.9	2.9	137
9	5.1	2.2	3.2	85
10	6.6	2.5	5.2	12
11	8.0	2.7	3.6	48
12	6.4	2.8	3.7	118
13	6.8	3.4	3.6	74
14	7.4	4.1	3.2	185
15	7.3	3.8	2.8	47
16	6.4	3.5	3.7	35
17	6.8	3.4	3.8	102
18	7.7	3.6	2.8	96
19	7.3	3.1	3.7	67
20	6.4	3.5	3.6	49

Table 3: Experimental IMA levels in Control group.

Sl no.	1	2	3	4	5	6
IMA(ABSU)	0.39	0.125	0.062	0.098	1.42	0.42

### Discussion and conclusion.

The present study evaluated that the amount of serum ischemia modified albumin from 20 serum sample from 8 females and 12 males of age bracket 23-73 years suffering from chronic kidney disease (CKD) and had undergone dialysis. The amount of IMA was notably and significantly increased in the dialytic CKD patient (0.26880±0.17385) compared the control group (0.09033±0.40332). These finding reveal that IMA amount in serum can be used as a biomarker in accessing the degree of chronic infections of the kidney. It's still remained a question to be answered by future study how the concentration of IMA varies in

different stages of prediabetes, diabetes and chronic diabetes in order to bring out what different concentrations predict about the fatal threat of CKD. Despite IMA being elevated in dialytic CKD patient, previous reported several other conditions under which IMA can be significantly elevated most notably in cardiovascular and this suggest that IMA cannot be used as a specific and definite biomarkers of CKD dialytic patients. The protein components of kidney functional test (albumin, globulin and total protein) show significant correlation with serum IMA. Total protein was found to be significantly positively correlated to IMA implying that IMA level seems to strongly depend on the total protein and perhaps suggest that the amount of serum IMA should be made in reference to serum albumin levels, for example IMA/albumin ratio. Further comparative analysis of pre-renal and post renal IMA concentrations with respect to total protein, globulin and albumin could give more incites on the intensity of the CKD. Globulin had significant correlation to IMA levels as well as

albumin. Use of large sample size could however bring out more clear significant correlations between these variances. Serum concentration of Random Blood Sugar and urea had very insignificantly

### List of Abbreviations

IMA: Ischemia Modified Albumin.

ACB: Albumin Cobalt Binding

ABSU: Absorbance Units

CKD: Chronic Kidney Disease.

RBS: Random Blood Sugar.

DTT: Dithiothreitol.

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