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# SOME ENZYMATIC ACTIVITY IN SERUM WITH CHRONIC RENAL FAILURE

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## ABSTRACT

The research was concerned with measuring the activity of the following enzymes: Paraoxinase (PON1), proilase (PRO), aryl esterase (Ary), Lactonase, Glutathion – Stransferase (GsT), polymine oxidase (PAO), Glucoolatonase (GIN), Nitric oxide (NO) and Superoxide dismutase (SOD), in serum with chronic renal failure (CRF) undergoing hemodialysis, seventy nine patients with CRF before heomdialysis and eighty healthy controls were in clouded in this study. Two groups of CRF patients and healthy subjects were divided according to age (20 – 40) and (40 – 65) respectively. The result showed a significant decrease in serum PONI, Ary, Lactonase (Lac), GIN, NO, SOD, ADA activities in CRF patients while PAO, GST increase significantly in serum patients compared to normal individuals.

**KEYWORD:** PONI, PR, Ary, Lactonase, GST, PAO, ADA, NO, SOD, CRF.

- **This work is taken from her ph. D thesis**

## 1- INTRODUCTION

Chronic kidney disease (CKD) is a worldwide public health problem, with dverse outcomes of kidney failure and premature death. CKD is defined as kidney damage of glomerular filtration rate (GFR) <60ml /min/ 1.73m2 for 3 months or more, irrespective of cause. Kidney damage in many kidney diseases can be a scertained by the presence of albuminuria, defined as albumin – to creatinine ratio>30mg/g in two of three spot urine specimens. GFP can be estimated from calibrated serum creatinine and estimating equation, (Levey *et al*., 2005).

**PONI Enzyme**

The enzyme paraoxonase |(PON1; EC. 3.1.8.1) detoxifies activated (Oxon) organ phosphorus pesticides (OPS) which are neurotoxic. PONI also is an antioxidants and several studies indicate that it inhibits oxidation of Low – density Lipoprotein, a marker of oxidative stress. (Karen, *et al*., 2009).

The enzyme arylesterase (Ary) (EC3.1.1.2) showing paraoxonase activity wereless understood than other esterase, especially carboxylesterase and lipase until recently most of the arylesterase and/ or paraoxonase repoted were form mammalian sources. Which plays important roles in the detocxification of the orangosphoric compounds as well as in the perevention of arther osclerosisc (Aharon, *etal*., 2004; Gur, *etal*., 2007).

The enzyme ADA is essential and wildely distributed enzyme of purine catabolism that catalyzes the hydrolytic deamination of adenosine and deoxyadenosine to inosine and deoxyinosine. (Black.I, urn, *et al*., 1996).

The PAO (PAO EC1.5.3.11) are FAD – dependent enzymes involved in poly amine catabolism (Con *et al*., 2006) the catalys the oxidantion of amines to produce the aldhyde and H202. (pohicelli. *et al*., 2012).

The enzyme GIN is a 34 protein whose tissue leves in the liver, kidney, and lung (Hasega wa, 2010). And GIN which functions enzymatically as alactonasehy drolyzes various carbohydrate lactonase. (Fujil, *et al*., 1999).

The GST (GST EC. 2.5.1.18) enzyme catalyze the covalent conjugation of glutathione (GSH) to eleclropilic substrates. GSH conjugation in activates elactrophilic molecules. (Gu engerich *et al*., 1987).

By replacing the electronegative functional group with sulfur atom of glutathione. Gst. Catalyze convalent conjuation of GSH via the cysteine thiolate of GSH. (Hayes *et al*., 2005) copper/zinc super oxide dismutase (Cu/Zn – SOD). Which catalyzes the conversion of super oxideanion into hydrogen peroxide and works concomitantly with hydrogen peroxide. Removing enzmes such as catalase and glutathione peroxidase (Aymelek *etal*., 2002).

Nitricoxide (NO) is one of the main factors involved in the anti atherosclerotic effects of endothelium several investigators have focused their attention on a possible role played by NO in the development of. Uremic symptoms. (Sarkar, *et al*., 2004).

The PR enzyme. An enzyme found in human and animal tissues, plays an important role in collagen catabolism and synthesis. (Karna, *et al*.,. 2000; Myara, *et al*., 1984).

## 2- MATERIAL AND METHODS

This research was conducted on a random sample of patients with CRF who attened the artificial kidney unit in BN – SINA hospital in Nineveh.

And the account patients (87) male and females ranging in their age between 20 – 65 years these samples were diagnosed clinically and radiologically as having CRF undergoing hemodialysis.

| **Parameters** | **References** |
|---|---|
| PON (U/L) | Pock, *et al*., 2008 |
| Ary (U/L) | Rock, *et al*., 2008 |
| Lactonase (U/L) | Rock, *et al*., 2008 |
| PR (U/L) | (Myara., *et al*., 1984) |
| ADA (U/L) | (Glustili, 1981) |
| PAO (U/L) | (Flayeh, 1988; Alkatib, 2000) |
| GST (U/L) | Habig *et al*.,(1974) |
| SOD (U/L) | (Brown and Goldsrin, 1983) |
| NO (U/L) | (Green, *et al*., 1982) |
| G/N (U/L) | Hucho and Wallenfels (1972) |

## RESULTS AND DISCUSSIONS

The results in table (1) showed that is a significant decrease ($p<0.05$) in PON1activity inpatients in comparison with control the results of the present study were agree with (Dantonine, *etal*., 1998l Para G. 1998).

Also results show that PON1/Ary activites are reduced in patients with CRF (Mockness ML., *et al*., 1993). And afree with (La Du, *et al*., 1993; Mackness, *et al*., 1996; Durr ington, *et al*., 2001; Aviram, *et al*., 1999; Gasselwander, *etal*., 1999). While few studies has previously pointed out findings about the level ADA activity in uremic patients especially those suffering from CRF in this study, table (1) and this results with agree (Sufrin, *et al*., 2006).

Also the results show there was a significant de crease in PR activity in CRF comared with normal subjects. Thie agree with (Gehyof *et al*., 1983) alsoe found higher activity in PAO activity in CRF patients. This agree with (Lgarashi, etal., 2006). While also we found increase this agree with (Founier, *et al*., 1992) also the results show the enzme lactonase is decreased in patients with CRF compared controles (table). This resultsis agree with (Teber, *et al*., 2003).

Also in this study was found that GIN is lower in patients with CRF and NO any studies about it. Also this study shows that NO is 10 wer in CRF patient compared with control this agree with (Saran, *et al*., 2003; Baylis, *et al*, 2006). While also she a significant decrease p(<0.05-) in SOD activity. This is agreement with (Vaziri, *et al*., 1984, Nagane, *et al*., 2009).

We found a significant appositive correlation between paroxonase and all enzymes expect enzymes GST a negative correlation at the level 0.01 table (2) while found a negative correlation between enzyme lactonase and all enzymes above except enzymes GST and prolidase appositive correlation table (2). Also found a negative correlation between enzyme prolidse and all enzymes above except enzyme Lac appositive correlation. Also found a negative correlation between PAO and all enzymes except Lac and PR table (2). Also found NO correlation between all enzymes and NO, SOD. Also we found appositive correlation between ADA and all enzymes except PON1. A negative correlation table (2).

**Table (1) theenzymes activity and concentration of the parameters in blood serum of hemodialsis patients and control subjects.**

| Rang of age | N | PON1 U/L | PR U/L | Lca U/L | PAO U/L | G/N U/L | ADA U/L | Ary U/L | G/N U/L | NO U/L | SOD U/L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **40 – 65 patients** | 43 | 0.064∓ 0.001h | 34.197∓ 0.427c | 38.566∓1. 315a | 15.12∓ 0.500e | 0.159 ∓ 0.0055a | 0.144 ∓ 0.0047a | 15.07∓ 0.23a | 6.85∓ 0.15e | 443∓ 8.3a | 3.233∓ 0.33b |
| **40 – 65 normal** | 42 | 0.129∓ 0.002a | 45.28∓ 0.49d | 73.544∓ 0.924b | 6.286∓ 0.233c | 1.559∓ 0.041c | 2.521 ∓ 0.0404b | 24.77∓ 0.483b | 1.5412 ∓ 0.036a | 46.707∓ 3.2b | 3.96∓ 0.36c |
| **20 – 40 patients** | 40 | 0.174∓ 0.003d | 26.025∓ 0.35 | 140.174∓ 1.924d | 2.4505∓ 0.054q | 0.13G ∓ 0.0054b | 2.48∓ 0.0549a | 35.193∓ 1.28c | 13.365 ∓ 0.235e | 56.6∓ 0.78c | 4.15 ∓ 0.38d |
| **20 – 40 normal** | 44 | 0.246∓ 0.004e | 65.40∓1 .18f | 179.263∓ 71.653e | 3.332∓ 0.049ab | 2.423 ∓ 0.039e | 3.630 ∓ 0.045d | 76.293∓ 2.4e | 2.399 ∓ 0.0858b | 58. ∓ 0.65D | 4.9 ∓ 0.15C |
| **Total patients** | 79 | 0.153∓ 0.002c | 30.05∓ 0.56b | 91.298∓5. 867e | 8.622∓ 0.762d | 0.264 ∓ 0.012ab | 0.1477 ∓ 0.007a | 25.80 ∓ 1.38b | 10.1905∓ 0.3967d | 43.2∓ 8.1ab | 4.5∓ 0.26cd |
| **Total normal** | 86 | 0.159∓ 0.10dc | 50.54∓ 0.819e | 127.633∓ 75.810d | 4.739∓ 0.194b | 1.996 ∓ 0.055d | 3.0089 ∓ 0.067c | 49.24 ∓ 3.19d | 1.9805∓ 0.066ab | 55.5∓ 0.64ad | 3.5∓ 0.245d |

The similar litters means no significant at the level $p<0.05$.

The different litters means significant level $P<0.05$.

**Table (2) correlation between enzymes in patients with chronic renal failure correlation is significant at the 0.01.**

| | **SOD** | **NO** | ARY | **GST** | GLN | **ADA** | PAO | **PRO** | LAC | **PON1** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.6445 | 0.866 | 0.832 | -0.955 | 0.514 | 0.538 | 0.671 | 0.975 | 0.780 | 0.000 | PON1 |
| -0.703 | 0.604 | -0.659 | 0.771 | -0.778 | -0.777 | -0.745 | 0.639 | 0.000 | -0.780 | LAC |
| 0.608 | -0.733 | -0.218 | -0.972 | -0.974 | -0.974 | -0.876 | 0.000 | 0.639 | -0.952 | PRO |
| - 0.658 | -0.89 | 0.663 | -0.607 | -0.658 | -0.664 | 0.000 | 0.876 | 0.745 | -0.671 | PAO |
| -0.633 | -0.692 | 0.831 | 0.952 | 0.404 | 0.000 | 0.664 | 0.974 | 0.777 | -0.538 | ADA |
| -0.848 | -0.77 | 0.831 | -0.901 | 0.000 | -0.404 | 0.658 | 0.974 | 0.778 | -0.514 | GLN |
| -0.584 | -0.81 | 0.821 | 0.000 | 0.901 | -0.952 | 0.607 | 0.972 | -0.771 | 0.953 | GST |
| 0.499 | -0.692 | 0.000 | -0.821 | -0.828 | -0.831 | -0.663 | 0.218 | 0.659 | -0.832 | ARY |
| 0.599 | 0.000 | 0.692 | 0.81 | 0.77 | 0.692 | 0.89 | 0.733 | -0.604 | -0.866 | NO |
| 0.000 | -0.599 | 0.499- | 0.584 | 0.848 | 0.633 | 0.658 | -0.608 | 0.703 | -0.6445 | SOD |

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