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Rise in Blood Antioxidant Enzymes for Early Diagnosis of Metabolic Changes (Observation Study in Rats)

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The root cause of most cases of metabolic syndrome can be related to poor eating habits and life style [1]. Laboratory tests include glucose; lipid profile, insulin etc are used for diagnosis [2]. But they are expensive and not fit for population survey. So we examined sensitive and low-cost parameters as alternative measure of early diagnosis MS. Biphasic change in the activity of antioxidant enzymes [(SOD) and catalase] in Red Blood Cell (RBC) can be used as a tool for diagnosis tests of MS. Onset of disease it initially increases as adaptive mechanism then permanently declines at the end. We performed 3 experiments. 1st is cisplatin induced kidney damage was studied for 5 days. 2nd is streptozotocin induced diabetes studied for 5 days. 3rd is High Fructose Diet (HFD) induced hyperlipidemia studied for 80 days. The activity of catalase [3] and SOD [4] were measured in blood. For disease manifestation, serum urea was considered in case of cisplatin [5]; blood glucose in case of streptozotocin (STZ) [6] and serum Triglycerides (TG) in case of HFD [7]. Mutual correlation was carried out by using statistical method by unpaired t-tests. Interestingly significant gradual rise was noted in activity of catalase and SOD up to 2 days of cisplatin treatment without any rise in serum urea. On later days, the activities of these enzymes declined below normal and serum urea was increased significantly. In STZ treatment, activities of catalase and SOD were increased in first 3 days without rise in blood glucose, but later on, these activities declined and blood glucose level was increased. The HFD feeding gradually raised activity of these enzymes, up to 50 days, without any rise in TG. After 50 days activities of catalase and SOD got declined and TG found to be raised (Table 1). The initial rise in activity of catalase and SOD could be the body's adaptive mechanism to encounter the free radical mediated stress, which is usually generated in pathogenesis of any metabolic stress. Thus, their raised activity would be more prominent parameter than their declined activity, which is often considered in present scenario. It could be used for population survey to identify persons, pre-disposed to life style and diet related diseases, especially the Metabolic Syndrome (MS).The persons having higher values of catalase and SOD, would be warned to life style changes to prevent MS, which is spreading worldwide, especially in developing countries [8].

Table 1: Antioxidant status in 3 different models of MS.

Treatment	Antioxidant parameters		Disease parameter
	Catalase	SOD	Urea
Cisplatin			
Basal value	1.02±0.12	0.40±0.03	33±1.9
Day 1	1.8±0.03*	0.62±0.04**	35.4±1.72*
Day 2	3.84±0.05*	0.78±0.02**	40.5±1.78**
Day 3	2.84±0.11**	0.37±0.03*	69.1±1.8***
Day 4	2.05±0.09***	0.14±0.01**	118.8±11***
Day 5	0.75±0.05***	0.01±0.001***	138±17***
Streptozotocin			glucose
Basal value	0.95±0.07	0.45±0.04	120±5.0
Day 1	1.0±0.2*	0.85±0.17***	122±10***
Day 2	1.2±0.17**	1.12±0.08***	133±15***
Day 3	1.3±0.03***	1.19±0.08***	131±11***
Day 4	1.07±0.15***	0.62±0.02***	191±7.6***
Day 5	0.78±0.10***	0.37±0.08*	198±8.5***
High fructose diet			TG
Day 1	1.0±0.02	0.45±0.03	52±3.5
Day 20	1.6±0.048	0.82±0.08***	59.1±.5***
Day 40	1.7±0.057	0.89±0.07**	65±4.0***
Day 50	1.7±0.08*	1.75±0.06*	85±2.8***
Day 60	0.84±0.06*	0.195±0.01***	85.5±4.3***
Day 70	0.13±0.01**	0.19±0.015**	115±4.0***
Day 80	0.12±0.009***	0.17±0.01***	117±13**

Data presented as mean± SD. (N = 6.) and analyzed by 1-way ANOVA. $p < 0.05$ = *, $p < 0.01$ = **, $p < 0.001$ = ***, $p > 0.05$. Asterisks indicate significant differences. *P* Values of less than 0.05 have been considered as statistically significant. When compared basal value with different days of treated rat (Cisplatin, Streptozotocin, High fructose diet).

References

1. Tripathi YB. Molecular Approach to Ayurveda. Indian J Exp Biol. 2000; 38: 409-414.
2. Kumakura H, Fujita K, Kanai H, Araki Y, Hojo Y, Kasama S, et al. High-sensitivity C - reactive protein, Lipoprotein (a) and Homocysteineare Risk Factors for Coronary Artery Disease in Japanese Patients with Peripheral Arterial Disease. J Atheroscler Thromb. 2015; 22: 344-354.
3. Aebi H.Catalase *in vitro*. Methods Enzymol. 1984; 105:121-126.
4. Beauchamp Charles and Fridovich Irwin. Superoxide Dismutase: Improved Assays and an Assay Applicable to Acryl amide Gels. Analytical Biochemistry. 1971; 44: 276-287.
5. Singh Amrit pal, Junemann Arunachalam, Muthuraman A, Jaggi AS, Singh Nirmal, Grover Kuldeep, et al. Animal models of acute renal failure. Pharmacological reports. 2012; 64: 34-44.

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6. Srinivasan K and Ramarao P. Animal models in type 2 diabetes research: An overview. Indian J Med Res. 2007; 125: 451-472.

7. Kucera Otto and Cervinkova Zuzana. Experimental models of non-alcoholic fatty liver disease in rats. World J Gastroenterology. 2014; 20: 8364–8376.

8. Eckel RH, Grundy SM and Zimmet PZ. The metabolic syndrome. Lancet. 2005; 365: 1415-1428.

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