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Estimation of Oxidative stress states in DM type1 in Iraqi patients

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Abstract : The present study was carried out to investigate redox modulation in diabetes mellitus type 1 in Iraqi patients, social demographic, total antioxidant and reactive oxygen species were using to estimate oxidative stress states in DM patient, the results show that there was high prevalence at over 50 years, the total antioxidant level was significant elevation in patients than control while ROS level was no-significant variation between study groups.
Keywords: Oxidative stress, DM type1, Iraqi patients.

Introduction

The review of literature clarified the role of oxidative stress (OS) states in many disease, the unbalance between reactive oxygen species (ROS), reactive nitrogen species(RNS) and antioxidant molecules causes incidence, progressive disease and complication, in DM it is believed that the OS has been important factors contributed of cell disorders in DM, beginning by hyperglycemia[1-3]in spite of some authors improved that indirect link between hyperglycemia and OS[4].The pathogenesis of diabetic complications is associated with increment of free radicals levels[5]and decreased antioxidants activity of molecules[6].

Type 1 diabetes (T1D) is an autoimmune disorder involving immune-mediated recognition of islet β-cells by auto reactive T cells, which leads to the elevated of ROS and pro-inflammatory cytokines, resulting in the destruction of pancreatic β-cells and loss of insulin secretion. the cause of T1D have been unknown despite of a large investigations deal with T1D, studies clarified that there are many factors have role in this disease like genetic susceptibility, environmental factors, and dietary deficiencies are known to contribute to disease, however, the impact of oxidative stress in a genetically susceptible individual is of particular interest. Oxidative stress becomes harmful when the production of free radicals overcomes antioxidants activities. oxidative stress has been linked to β-cell cytotoxicity[7-9] and has been suggested to play a role in T1D pathology[10-13].

Materials and methods

Study subjects

The present study is case –control study included 30 patients and 30 control, samples were collected from diabetic center in al-sadder hospital. Data were collected from patients and control in questioner then 5 ml of Venus blood were collected in gel tube to separation serum, it centrifugation at 4000 rpm\min for 10 min, serum were stored in -20 c to detected total antioxidants and ROS levels. Total antioxidant and ROS were estimation in serum using ELIZA kits (elabscience),the data were analyzed using spss version 21.

Results

The results of present study show there is significant variation between patients and control in ROS and TAO levels in diabetic patients type 1. First of the all the demographic study showthat the weight mean of study population was 78.76 for patients and 75.00 for control, and significant differences in BMI and gender, male were more frequent than female in patients while it less in control.

Mean of age was convergent in patients and control. according to family history; more than half population have family history of this disease and large percentage was no smoker habitats and passive smoking, other disease related with patients ware hypertension, it was 50% of population study. BMI was classification to 4 categories, the high percentage was in obesity, and overweight respectively in patient while in control over weight was the higher. Age was classification in to four categories, (51-60) was more frequent than others in patient and control (table-1).

Table (1) distribution studysubjects according to Demographic

Categories	Patients	Control	Statics	p-value
Weight kg	78.76±11.95	75.00±8.514	1.3544	0.1814
BMI	31.09±6.218	26.307±3.307	3.6245	0.0006*
Gender				
Male	69.23	48.27	2.474*	0.1157
Female	30.769	51.72		
Age	49.03±12.43	50.52±6.500	0.5654	0.5742
Duration	11.63±6.88			
Family history				
no	57.67	0		
yes	42.30	0		
Smoking				
no	84.615	68.96	0.187*	0.6656
yes	15.38	17.24		
Passive smoking				
No	88.46	100	3.065*	0.0800
yes	11.54	0		
Hypertension				
No	50	0		
Yes	50	0		
BMI categories				
Under weight	3.8%	0		
Normal	7.69%	16%		
Over weight	38.46%	72%		
Obesity	50%	12%		
Age categories				
<30	7.69	0		
31-40	15.38	0		
51-60	11.53	40		
>50	65.38	60		

The mean differences of TAO show significant differences (p value 0.0075,t = 2.7836) figure (1), the difference between ROS in patients and control was non-significant (p value 0.9438, t=0.0709) (figure 2).

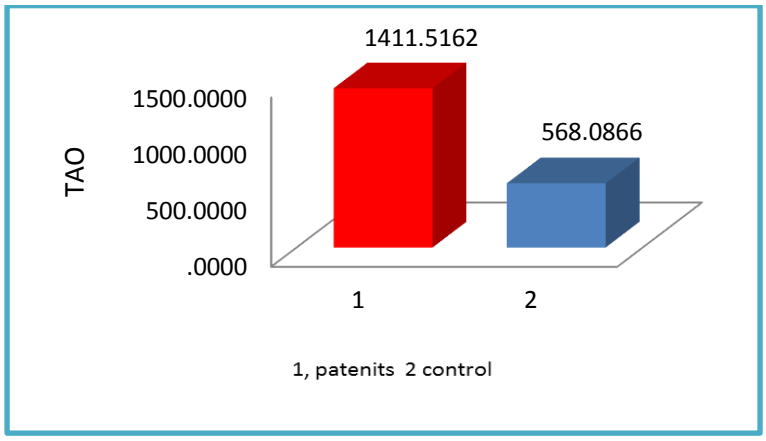
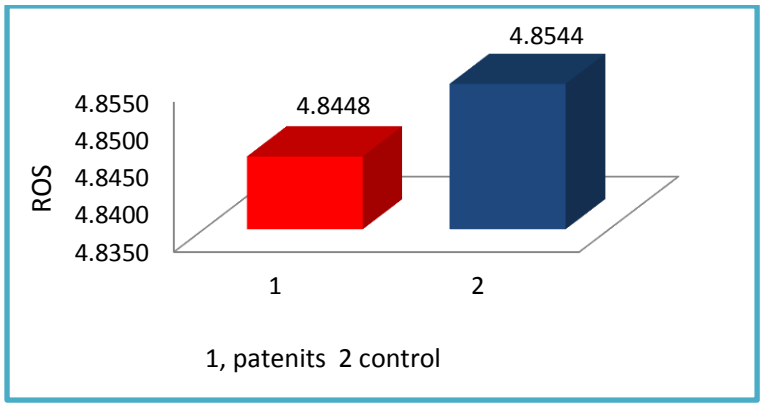


Figure (1) Mean differences of TOA level of patients and control.



Figure(2) Mean differences of ROS level of patients and control

Table (2) show mean differences of ROS according to demographic classification , all results indicated that there were no significant differences between patient and control except in gender , male in patients hadsignificant decrease in level of ROS, also ROS level was increased with body mass index in non-significant increment, significant differences was shown in age categories it recoded high level in (31-40).

Table (2) reactive oxygenspecies level in study gropes according to demographic study

Categories	Patients	Control	Statics	p-value
Gender				
Male	4.831±0.139	5.027±0.062	4.8972	0.0001*
Female	4.87±0.073	4.716±0.899	0.4784	0.6373
Duration				
1-10	4.8517±0.168	0	0.0461	0.9636
11-20	4.84±0.09	0		
Family history				
no	4.83±0.148	0	0.4028	0.6907
yes	4.85±0.083	0		
Smoking				
no	4.855±0.08	4.788±0.805	0.3888	0.6995
yes	4.78±0.27	5.051±0.03	2.2670	0.0577
Passive smoking				
No	4.84±0.12	4.83±0.736	0.1418**	0.8884
yes	4.85±0.002	0		
Hypertension				
No	4.84±0.088	0	0.0000**	1.0000

Yes	4.84±0.153	0		
BMI categories				
Under weight	4.56±0.23	0	1.130**	0.347
Normal	4.78±0	4.62±1.099		
Over weight	4.84±0.099	4.99±0.09		
Obesity	4.89±0.057	5.132±0.03		
Age categories				
<30	4.59±0.27	0	4.76**	0.010*
31-40	4.90±0.36	0		
51-50	4.88±0.056	4.65±0.99		
>50	4.85±0.94	5.011±0.142		

The mean differences and statically analysis of TOA level in patients and control according to demographic was clarified in table (3), there were significant increment in TOA in male and female of patients and its level increment also with duration of disease and in the patienthadn't family history, smoking behavior show high level of TAO, and passive smoker have major role in TAO elevation in patients , the patients suffer from hypertension recorded high level of TAO, and it had positive association with BMI. According to age categories there is no association between age and TAO level.

Table (3) total antioxidant level in study groups according to demographic study

Categories	Patients	Control	Statics	p-value
Gender				
Male	1535.78±1467.85	722.2±132.7	2.0598	0.0482*
Female	1131.92±713.97	444.79±270.7	3.3556	0.0030*
Duration				
1-10	1366.69±796.28	0	0.1518**	0.8806
11-20	1439.52±1535.37			
Family history				
no	1590.83±1361.71	0	0.8275**	0.4161
yes	1166.98±1183.20	0		
Smoking				
no	1440.88±1335.58	425.83±254.14	3.3407	0.0018*
yes	1249.99±1082.74	270.12±175.17	2.0257	0.0824
Passive smoking				
No	1293.49±1142.89	398.75±246.31	1.3187**	0.1997
yes	2316.37±2189.35	0		
Hypertension				
No	1396.76±1242.85	0	0.0575	0.9546
Yes	1426.27±1371.06	0		
BMI categories				
Under weight	2147.34±170.6	0	F=1.486**	0.231
Normal	2084.45±0	365.26±214.97		
Over weight	1489.78±1667.56	374.72±189.48		
Obesity	1186.29±1071.85	377.68±239.93		
Age categories				
<30	217.56±129.4	0	0.479**	0.70
31-40	1167.64±865.97	0		
51-50	4826.4±478.8	641.75±1326.23		
>50	1482.1±1496.9	429.154±256.41		

Discussion

The present study investigate to estimate oxidative stress state in DM type1 in Iraqi patients, oxidative stress has been the most important factors which studied in different scientific researches because of its role in progression and complication of disease . DM prevalence in Iraq recorded elevation inthe last years, in Basra Mansour *et al*., (2015)[14].Show that the prevalence of diabetes is very high, affecting one in five adults. The epidemic of diabetes will result in strain on the financial resources of health care systems.

The elevation of total antioxidant level in patients resulted from increment of free radicals which are formed disproportionately in diabetes by glucose oxidation, non-enzymatic glycation of proteins, and the subsequent oxidative degradation of glycated proteins. Thislead to damage of cellular organelles and enzymes activity, increased lipid peroxidation, and development of insulin resistance[17].

In diabetes mellitus, main sources of oxidative stress are mitochondria. During oxidative metabolism in mitochondria, a component of the utilized oxygen is reduced

to water, and the remaining oxygen is transformed to oxygen free radical (O^{-}) which is an important ROS that is converted to other RS such as $ONOO^{-}$, OH and $H2O2$[16].Insulin signaling is modulated by ROS/RNS by two ways. On one side, in response to insulin, the ROS/RNS are produced to exert its full physiological function and on the other side, the ROS and RNS have got negative regulation on insulin signaling, interpreting them to develop insulin resistance which is a risk factor for diabetes type 2 [17].

The life style of third world contributed in oxidative stress balance in DM patients , like nutrition, sleeping inadequate, food supplements, sport playing and smoking, all these factors can be effect in free radicals producing and scavenger by antioxidant enzymes and molecules[18,19].

Some genetic polymorphism contributed in the oxidative stress state like catalase, super oxide dismutase , and TNF- alfa some of these gene were association with DM and other no association with this diseases[20] The present study need more investigation like study antioxidant gene polymorphisms to evaluation oxidative states

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