



وزارة التعليم العالي والبحث العلمي
جامعة ميسان
كلية التربية الأساسية

Ministry of Higher Education and Scientific
Research
University of Misan
College of Basic Education

Misan Journal for Academic Studies
Humanities, social and applied sciences

مجلة ميسان
للدراسات الأكاديمية
العلوم الانسانية والاجتماعية والتطبيقية

ISSN (Print) 1994-697X
(Online)- 2706-722X

المجلد 24 العدد 53 اذار 2025

Mar 2025 Issue53 VOL24



مجلة ميسان للدراسات الاكاديمية

العلوم الإنسانية والاجتماعية والتطبيقية

كلية التربية الأساسية / جامعة ميسان / العراق

Misan Journal for Academic Studies

Humanities, social and applied sciences

College of Basic Education/University of Misan/Inq

ISSN (Print) 1994-697X (Online) 2706-722X

2025	اذار	العدد 53	المجلد 24
2025	Mar	Issue53	VOL24



OJS / PKP
www.misan-jas.com

IRAQI
Academic Scientific Journals



ORCID

OPEN ACCESS



 journal.m.academy@uomisan.edu.iq

رقم الابداع في دار الكتب والوثائق بغداد 1326 في 2009

الصفحة	فهرس البحوث	ت
14 - 1	Evaluation of anti-plaque and anti-inflammatory efficacies of mouth rinse containing green tea and <i>Salvadora Persica L.</i> in the management of dental biofilm-induced gingivitis Aliaa Saeed Salman Maha Abdul Azeez Ahmed	1
26 - 15	Evaluation of galectin-3 and peptidyl arginine deiminase-4 levels in saliva for periodontal health, gingivitis and periodontitis Yusur Ali Abdulrazzaq Alaa Omran Ali	2
37 - 27	EFFECT OF HYPOCHLOROUS ACID ON SURFACE ROUGHNESS AND WETTABILITY OF ZINC OXIDE EUOGENOL IMPRESSION PASTE Israa J.Taha Shorouq M. Abass	3
47 - 38	Annual groundwater recharge estimation in Nineveh plain, northern Iraq using Chloride Mass Balance (CMB) method Fatima AJ. Abdul Wahab Alaa M. Al-Abadi	4
61 - 48	A Theoretical Study for Excitation of Electrons Collides with Positive Nitrogen Ions Hawraa S. Kadhim Alaa A. Khalaf	5
72 - 62	Green synthesis of gold nanoparticles (AuNPs) using pathogenic bacteria <i>Acinetobacter baumannii</i> with evaluation their antibacterial activity Hawraa Khalaf Abbood Rashid Rahim Hateet	6
82 - 73	Structural, Optical and Gas Sensor Properties of Zinc Oxide Nanostructured thin films prepared by Chemical Spray Pyrolysis Ameer I. Khudadad Ezzulddin Abdoulsahib Eesee	7
91 - 83	Soft denture liner and its additives (A review of literature) Ibrahim Ali Al-Najati Ghasak Husham Jani	8
103 - 92	A Critical Discourse Analysis of the Language of Persuasion in Political Discourse Mohammed Hussein Hlail	9
116 - 104	A Comprehensive Review of Rice Husk Derived Silica As Nano Filler (A review of literature) Azza Walaaldeen Khairi Huda jaafar naser	10
125 - 117	Evaluation of Superoxide Dismutase and their association with Diabetic neruopathy and Heart disease in Iraq populations Zainab A. Salman	11
139 - 126	Schema Theory in Sarah Moss's "The Fell": A Cognitive Stylistic Study Salah R. Al-Saed Nazar Abdul Hafidh Abeid	12
149 - 140	Validation and Development of UV spectroscopy method for the Estimation of Diclofenac sodium in Bulk and dos protected mode interface Mohammed R . Abdul - Azeez	13
167 - 150	Using A Genetic Algorithm to Solve the Inventory Model with A Practical Application Ahmed Jamal Mohammed Al-Botani Faris Mahdi Alwan Al-Rubaie	14
180 - 168	Seasonal Variatins of Polychlorinted Biphenyls compounds in Water of Tigris River , Maysan Province / Iraq Halima Bahar Kazem and Salih Hassan Jazza	15

200 - 181	The Reasons Behind the Societal Reversal on the Governance of Amir al-Mumineen After the Prophet's Death (Peace (PBUH)) Through the Sermons of Lady Fatima al-Zahra (Peace Be Upon Her) Fatima Abd Saeed Al-Maliki	16
217 - 201	The place and its Implications in Adghat Madinah novel " Saja Jasim Mohammed Assistant Instuctor	17
233 - 218	The Level of Strategic Thinking Among School Principals in the Center of Misan Governorate from the Perspective of Their Teachers Multaka Nasser Jabbar	18
253 - 234	The reality of the practice of Arabic language teachers in the primary stage of reciprocal teaching from the perspective of the specialty supervisors Khadija Najm Abdel Qader Ramla Jabbar Kazem	19
274 - 254	Optimal storage model to sustain the operation of Baghdad stations Establish an Faris Mahdi Alwan Ahmed Ali Mohammed	20
284 - 275	Poetry on the tongue of the other, a media vision. The poetry of Abu Marwan al-Jaziri (396 AH) is an example Sabreen Khalaf Hussein	21
297 - 285	Saudi-Japanese relations1938-1973(historical study Ali Joudah Sabih Al-Maliki Faraged Dawood Salman Al-Shallal	22
313 - 298	Influences on Al-Asma'i's Critical Judgment (A Critical Study) Hussam Kadhim Atiyah	23
334 - 314	The Effect of Felder and Silverman's Model in the Achievement of Fifth High School Female Students and Their Lateral Thinking in Mathematics. Shaymaa Kareem Hassoon	24
344 – 335	Enzymatic Activity of Fungi Isolated From the Bases of Stems and Roots of Faba Bean Plants Infected with Root Rot Disease Asia N Kadim Ali A Kasim Ghassan Mahdi Daghir	25
364 - 345	Alternative Means for Resolving Disputes Arising from Trading in the Securities Market (A Comparative study) Saja Majed Daoowd	26



ISSN (Print) 1994-697X
ISSN (Online) 2706-722X

DOI:
<https://doi.org/10.5463/3/2333-024-053-011>

Received:28/12/2024
Accepted:18/2/2025
Published online:31/3/2025



Evaluation of Superoxide Dismutase and their association with Diabetic neuropathy and Heart disease in Iraq populations

Zainab A. Salman¹

¹ Department of Basic Science, College of Dentistry, University of Baghdad, Iraq

email: zainab.ali@codental.uobaghdad.edu.iq
(ID): <https://orcid.org/0000-0003-2071-7490>

ABSTRACT:

Complications of diabetes mellitus include both micro vascular and macro vascular complications. Diabetes mellitus causes diabetic neuropathy due to elevated blood glucose levels. High oxidant levels in diabetes complications are linked to oxidative stress, with reactive oxygen species (ROS) being a major oxidant. Endogenous antioxidants, such as SODs, are crucial for protecting cells and can be involved in cardiovascular diseases. The purpose of this study is to assess the levels of enzymatic Superoxide Dismutase in patient sera. Ninety persons were subdivided into two groups included in this study (25 patients with Diabetic neuropathy and 25 patients Heart disease), and 40 healthy subjects as a control group with range age of 30-60 years old. The enzymatic antioxidants of superoxide dismutase SOD levels were measured by enzyme linked immunosorbent assay (ELISA) method. The findings showed that the patient group's levels of lipid profile, urea, creatinine, ESR, and SOD were considerably higher than those of the control group ($p < 0.05$). When diabetic neuropathy disease is present, the production of free radicals rises along with the SOD level. These antioxidants are thought to be useful markers for assessing the degree of oxidative stress in heart disease and diabetic neuropathy. Additionally, employ them as indicators for the early identification of heart disease and diabetic neuropathy. Analysis of the Receiver Operating Characteristic (ROC) curve revealed that SOD is a reliable indicator for the diagnosis of heart disease and diabetic neuropathy.

Key words: Serum blood, superoxide dismutase SOD, Lipid profile Diabetic neuropathy, heart disease.

INTRODUCTION:

Complications of diabetes mellitus include both micro vascular and macro vascular complications (Ibrahim et al., 2020, - Mohammed et al., 2024). Diabetic neuropathy, retinopathy, and nephropathy are represented the major micro vascular complications that induced by hyperglycemia, hypertension, and dyslipidemia (Hamid et al., 2021, Balaky and Kakey, 2021, Ghudhaib, 2018, Aneed et al., 2024). One common diabetic

consequence that arises from hyperglycemia and long-term diabetes is diabetic neuropathy (DN). Diabetic peripheral neuropathy (DPN) and diabetic autonomic neuropathy (DAN) are the two categories under which it falls. DPN is regarded as a clinical condition affecting the peripheral nerves, which are divided into two groups: sensory and motor neurons (Zeng et al., 2017). Additionally, diabetic sensory neuropathy was separated into other secondary kinds based on its symptoms, which can be either positive or negative. After 25 years of diabetes, diabetic neuropathy is more common in persons with the disease, particularly those with poor glycemic control (D'Amato et al., 2016). In diabetes mellitus, metabolic pathways such as mitochondrial, enzymatic, and non-enzymatic pathways are thought to be the primary causes of oxidative stress. Damage to blood vessels, enzymes, and enhanced insulin resistance may be primarily caused by lipid peroxidation, protein glycation, and glucose oxidation (Mohammed et al., 2018). Chemicals known as antioxidants, which can be either enzymes or non-enzyme biochemical compounds, are found in trace amounts and prevent oxidation. They also block the oxidative pathways that lead to progressive diseases and are linked to oxidative stress in diabetes patients (Shinde et al., 2012, Mahmood et al., 2016).

Vascular heart disease (VHD) is a serious disease and one of the major health problems that can affect elderly people often (Al-Hussona and Ahmed, 2019). The valves defects leads to weakening of the heart and the inability of to pump blood around, therefore; these defects sometimes present due to the closure or damage of one or more of the four heart valves, such as: aortic, mitral, pulmonary and tricuspid (Kabata et al., 2018). The mitral and aortic valves are the most frequently affected by vascular heart disease. Unfortunately, the valves problem can occur for various reasons, including: congenital defects at childbirth while others may be gained later in life like, aging leads to degenerate of heart valve tissue, obstruction of valves as a result of the accumulation of high fats in the blood such as: high cholesterol as well as acquired obstruction occurs due to impaired heart function (Zoriæ et al., 2019). In addition, several significant risk factors may leads to VHD including: Age, gender, hypercholesterolemia, smoking, rheumatic heart disease, diabetes and hypertension (Ma et al., 2018, Mohammed 2024).

This study looks at the levels of superoxide dismutase (SOD) enzymatic antioxidants in the blood serum of Iraqi patients with heart disease and diabetic neuropathy as chemical indicators that may remain utilized for initial illness diagnosis.

MATERIALS AND METHODS:

Venous blood samples were obtained from 25 patients with diabetic neuropathy and 25 patients with heart disease who were treated at the Baghdad Teaching Hospital in Medical City, as well as 40 individuals who served as a control group between March and April 2024. All subjects were between the ages of 30 and 60. Each sample consisted of 5 ml of venous blood collected in a gel tube and centrifuged for 10 minutes at 4000 rpm. An Eppendorf tube was used to hold the serum. The remainder were kept at -20°C to estimate SOD, which was assessed using an enzyme-linked immunosorbent test (ELISA) kit made by Aviva Systems Biology in the United States.

Statistical analysis:

SPSS 24 program was applied in this study. ANOVA test was used for determined the significant differences in the case of two groups. Correlation coefficient (r) was determined between two

variables. Also, ROC curve analysis was applied in this work to knowledge the best parameter among the studied parameters for achieve the optimal diagnosis of the case under investigation.

RESULTS:

The demographic appearances of patients and control focuses are shown in table (1). Allowing to age, the mean age of patients with neruo was 31.17 ± 8.49 years old, 29.86 ± 8.50 years old for patients with heart, and that of control subjects was 36.40 ± 11.17 years old and there was significant difference between different groups ($P = 0.015$). Regarding to BMI, both groups of patients showed a significant increase ($p < 0.001$) compared to control groups (28.88 ± 3.49 and 28.45 ± 3.53) vs (26.78 ± 2.96) respectively, whereas non-significant difference ($p > 0.05$) was found between patient groups themselves. Furthermore, Erythrocyte Sedimentation Rate (ESR) levels in patients with neruo and patients with heart, (56.26 ± 8.96 mm/h, 48.22 ± 5.42 mm/h) respectively, were higher than healthy control subjects (5.14 ± 1.21 mm/h, $P < 0.001$). Serum SOD concentrations in patients with neruo were significantly greater than in patients with heart, or healthy control subjects (34.45 ± 9.77 , 48.44 ± 13.92 and 75.79 ± 14.75), respectively, $P < 0.001$).

Table 1: SOD level measurements and clinical data of the studied groups.

Characteristic	NERUO (n=25)	HARET (n=25)	Healthy Control (n=40)	P
Age (years)	31.17 ± 8.49^A	29.86 ± 8.50^A	36.40 ± 11.17^B	0.015
BMI kg/m ²	28.88 ± 3.49^A	28.45 ± 3.53^A	26.78 ± 2.96^B	0.032
Duration of disease	5.83 ± 1.64	3.65 ± 2.25		> 0.001
Cho mg/dl	208.10 ± 21.38^A	203.0 ± 16.27^A	164.21 ± 19.66^B	> 0.001
TG mg/dl	201.97 ± 10.13^A	186.37 ± 11.39^A	110.41 ± 12.43^B	> 0.001
HDL mg/dl	35.63 ± 3.92^A	40.72 ± 2.95^B	42.98 ± 7.84^C	> 0.001
LDL mg/dl	113.43 ± 12.20^A	109.80 ± 11.64^A	98.84 ± 16.19^B	0.007
Urea mg/dl	58.76 ± 7.56^A	32.16 ± 4.02^B	24.35 ± 7.12^C	> 0.001
Creatinine mg/dl	1.87 ± 0.458^A	0.87 ± 0.166^B	0.76 ± 0.28^B	> 0.001
ESR mm/h	56.26 ± 8.96^A	48.22 ± 5.42^B	5.14 ± 1.21^C	> 0.001
SOD (U/L)	34.45 ± 9.77^A	48.44 ± 13.92^B	75.79 ± 14.75^C	> 0.001
Different latters denote to the significant differences at $p < 0.05$				

Correlation between serum SOD levels and other parameters

Tables (2) displayed the relationships between serum SOD levels and other indicators in individuals with heart and neurological conditions. According to the current findings, there is a substantial relationship between SOD and serum creatinine in neruo patients. However, the current findings indicate that there is no significant relationship between SOD and any other parameter in either patient group.

Table 2: shows correlation among SOD and the studied parameters

Characteristic	SOD level			
	Neruo		heart	
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>
BMI	0.076	0.718	0.106	0.578
Cho	0.038	0.855	0.110	0.501
TG	0.027	0.824	0.025	0.946
HDL	0.124	0.518	0.229	0.255
LDL	0.013	0.951	0.213	0.273
Urea	0.334	0.090	0.188	0.323
Creatinine	0.405	0.027*	0.206	0.278
ESR	0.051	0.753	0.097	0.659

r=correlation coefficient*=consider difference

Diagnostic accuracy of serum SOD

Table 3 showed the ROC curve analysis data of SOD which are including area under the curve and cut of value together with specificity and sensitivity of SOD.

Table3: ROC curve analysis data of SOD in two groups

Variables	AUC	P-value	CV	Specificity	Sensitivity
neruo group	0.846	0.001	254.36	78%	85%
Heart group	0.812	0.001	247.1	71%	80%

AUC: area under curve, CV: cut of value (U/L).

DISCUSSION:

In diabetes, oxidative stress is essential for the emergence of microvascular and cardiovascular problems. SOD, or superoxide dismutase, is a crucial antioxidant enzyme. Humans include three different types of SOD: extracellular (EC)-SOD, manganese (Mn)-SOD, and copper/zinc (Cu/Zn)-SOD. According to the literature study, SOD has been linked to problems from diabetes. (Gómez-Marcos et al.2016) discovered that Cu/Zn-SOD positively correlated with plasma uric acid and triglycerides, while negatively correlated with pulse pressure, arterial stiffness index, and HDL cholesterol (Gómez-Marcos et al., 2016). In Chinese patients, serum EC-SOD activity was linked to the advancement of type 2 diabetes and was an independent risk factor for DR (Zhao et al., 2018).

According to Table (1) findings, there were non-significant ($p>0.05$) variations in the patients' and control groups' ages and BMIs, respectively. Other research concurs with this finding (Mahmood et al., 2013; Kamran M et al., 2016). As indicated in Table 1, there are notable variations in the urea and creatinine levels in the patient and control groups at the similar period. This finding contradicts earlier research (Ghudhib et al., 2018, Mohammed et al., 2018). The authors of the US guidelines on obesity came to the conclusion that higher BMI levels were linked to a higher risk of both fatal and nonfatal coronary heart disease in overweight and obese adults after conducting a systematic evaluation of the literature (Atique et al., 2016). Table 2's findings indicated that the sick group's SOD levels were significantly higher than those of the control group. These findings contradict those

of recent research that reported a reduction in endogenous antioxidants in diabetic conditions (Mesaros et al., 2012, Dincer et al., 2002). In the same manner, levels of ESR are significant increase in patients group compared with control group. Superoxide dismutase (SOD), a natural antioxidant enzyme, acts as a defense against free radicals, reducing diabetic complications when endogenous antioxidant levels are elevated (Bala and Haldar 2013, Catanzaro et al., 2013, Surai and Fisinin, 2014). Significant variations in SOD were also revealed by the ROC curve analysis results in this study. SOD shields the heart from oxidant-induced fibrosis, apoptosis, and function loss and is essential for proper cardiac morphology (Kliment et al., 2009). SOD has been suggested as a promising therapeutic target for DR because it can rectify the imbalance between ROSs and antioxidant scavengers and downstream consequences (Ikelle et al., 2019). It was discovered that SOD plays a protective function in the demise of retinal capillary cells and, eventually, in the pathophysiology of DR (Kowluru et al., 2006). Our research and all of these others show a strong correlation between SOD and long-term consequences from diabetes. In physical replicas, elimination of SOD in transgenic diabetic mice protects or accelerates cardiomyopathy (Mao et al., 2019), diabetic retinopathy (DR) (Zhaoliang et al., 2021), and nephropathy (De Blasio et al., 2017). However, data from clinical practice are subject to numerous confounding circumstances. This suggested that SOD is a preventative measure against complications from diabetes. It's interesting to note that SOD was only linked to cardiovascular problems associated with chronic diabetes in males, not women. Previous research did not show sexual dimorphism in this association. According to the research, patients without diabetes also showed sex variations in the connection between SOD and AS (Han et al., 2018).

Furthermore, the metabolic syndrome and other atherosclerosis risk factors, including diabetes, dyslipidemia, hypertension, and obesity, is linked to oxidative stress (Hopps et al., 2010). In individuals with cardiac disease, the probability of death is predicted by biomarkers of oxidative stress (Heslop et al., 2010). It has been demonstrated that oxidative stress contributes to the early vascular morbidity and death in diabetics (Doney et al., 2005). Oxidative stress is implicated in cardiovascular morbidity and mortality associated with diabetes, according to studies conducted in animal models (Stull et al., 2004, Yan-Jun et al., 2020).

SODs and other antioxidant enzymes scavenge reactive oxygen species (ROS) and prevent the vascular wall from degrading NO (Faraci FM, Didion SP 2004). Smooth muscle cells manufacture and secrete EC-SOD to the extracellular space, which is seen in high concentrations in the vascular wall (Kamel et al., 2015).

CONCLUSION:

Heart disease and diabetic neuropathy enhance the production of free radicals, which lowers endogenous antioxidants like SOD. In diabetic neuropathy and heart disease, this biochemical parameter is thought to be a useful indication of oxidative stress, and it may be utilized as a marker for the early diagnosis of diabetes problems. This assumption is supported by the use of Receiver Operating Characteristic (ROC) curve analysis. The strongest sign for illness diagnosis, according to the results of ROC curve analysis, is the SOD level.

Acknowledgements:

The author is very thankful to the Teaching Hospital, Baghdad Medical City, for their support to carry out this research.

REFERENCES:

- Aneed Noor Saeed; Ali Khalaf Ali ; Daragh Maitham Abdel Kazem. (2024). cytological and cytomorphological comparative study of oral mucosa in diabetes mellitus and nondiabetics in Misan Governorate. Msian Journal for Academic studies. Vol 23 :(50) : 176 – 168. DOI: <https://doi.org/10.54633/2333-023-050-013>
- Bala A and Haldar P K (2013). Free radical biology in cellular inflammation related to rheumatoid arthritis. OA Arthritis 01;1(2), 15. DOI:10.13172/2052-9554-1-2-1013
- Balaky H. M. and Kakey I. S. (2021). “Indications of Liver and Kidney Functions in Non-Insulin Dependent Diabetic Patients,” Iraqi J. Sci., pp. 769–778. doi: [10.2147/DMSO.S457799](https://doi.org/10.2147/DMSO.S457799)
- Catanzaroa O, Capponia J A, Michielia J, Labala E, Martinoa I D and Sirois P (2013). Bradykinin B1 antagonism inhibits oxidative stress and restores Na+K+ ATPase activity in diabetic rat peripheral nervous system. Peptides44,100–104. DOI: [10.1016/j.peptides.2013.01.019](https://doi.org/10.1016/j.peptides.2013.01.019)
- D’Amato C, Morganti R and Greco C (2016). Diabetic peripheral neuropathic pain is a stronger predictor of depression than other diabetic complications and comorbidities. DiabVasc Dis Res. 13(6):418-428. DOI: [10.1177/1479164116653240](https://doi.org/10.1177/1479164116653240)
- Dincer Y, Alademir Z, Ilkova H and Akcay T (2002). Susceptibility of glutathione and glutathione-related antioxidant activity to hydrogen peroxide in patients with type 2 diabetes: effect of glycemic control. Clin Biochem. 35, 297-30. doi: [10.1016/s0009-9120\(02\)00317-x](https://doi.org/10.1016/s0009-9120(02)00317-x).
- Faraci FM, Didion SP. (2004). Vascular protection: superoxide dismutase isoforms in the vessel wall. Arterioscler Thromb Vasc Biol . 24(8):1367–1373.doi: [10.1161/01.ATV.0000133604.20182.cf](https://doi.org/10.1161/01.ATV.0000133604.20182.cf)
- Ghudhib K K, Mohsen Firas Younis and Mohammed Hind Sadiq (2018). Evaluation of Antioxidant Levels in Blood Sera of Iraqi Patients with T2DM. Journal of Global Pharma Technology(JGPT). 10(03):895-899. <https://www.researchgate.net/publication/335950271>.
- Kabata° S, Civelek E, Ýnci C, Yalçýnkaya E Y, Günel G, Kýr G, Albayrak E, Öztürk E, Ada° G and Karaöz E (2018). Wharton’s jelly-derived mesenchymal stem cell transplantation in a patient with hypoxic-ischemic encephalopathy: a pilot study. Cell Transplantation 27(10):1425-1433. doi: [10.1177/0963689718786692](https://doi.org/10.1177/0963689718786692)
- Kamran M Hassan, Balaji R, Gnaneswaran S and Kumar J S (2016). To Study the Association of HbA1C with Retinopathy, Neuropathy and High risk foot among Diabetic patients attending Rural Tertiary Care Hospital of Tamil Nadu, India. Int J Ophthalmol Eye Res. 4(4): 206-211. DOI:[10.19070/2332-290X-1600042](https://doi.org/10.19070/2332-290X-1600042)
- Ma F, Gao J, Suo Q, You Q, Zhou J and Zhang A (2018). Risk prediction on electronic health records with prior medical knowledge. Paper presented at the Proceedings of the 24th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining.<https://doi.org/10.1145/3219819.3220020>
- Mahmood I H, Abed M N and Merkhani M M (2013). Effects of blocking of angiotensin system on the prevalence of metabolic syndrome in type 2 patients. Pak J Med Sci. 29(1):140-143. doi: <http://dx.doi.org/10.12669/pjms.291.2782>
- Mesaros C, Arora J S, Wholer A, Vachani A and Blair I A (2012). 8- Oxo-2'-deoxyguanosine as a biomarker of tobacco-smokinginduced oxidative stress. Free Radic Biol Med. 53, 610-6. <https://doi.org/10.1016/j.freeradbiomed.2012.04.006>
- Mohammed Hind Sadeq, Ghudhib Kadhimi K. and Mohsen Firas Younis.(2018). ESTIMATION OF ENZYMATIC AND NON-ENZYMATIC ANTIOXIDANTS IN SERA OF IRAQI PATIENTS

- WITH DIABETIC SENSORY NEUROPATHY. *Biochem. Cell. Arch.* Vol. 18(1): 000-000. https://connectjournals.com/file_html_pdf/2878600H_1011A
- Mohammed Maryam Moayd , Khaleel Fayhaa M. Estimating Apelin₃₆ Level in Obese and Non-obese Patients with Type2 Diabetes Mellitus. *Baghdad Science Journal.* (2024), 21(12 Suppl.): 3936-3946. DOI: <https://doi.org/10.21123/bsj.2024.9092>
 - Mohammed Menah Salman. (2024). Impact of Vitamin D3 Deficiency on Liver and Adipose Tissue in Pregnant Mice. *Misan Governorate. Msian Journal for Academic studies.* Vol 23(49) :1-12 .DOI: <https://doi.org/10.54633/2333-023-049-001>
 - Yan-Jun Song , Chong-Bin Zhong , Wei Wu. (2020). Resveratrol and Diabetic Cardiomyopathy: Focusing on the Protective Signaling Mechanisms. *Oxidative Medicine and Cellular Longevity* Volume 2020, Article ID7051845,p19. <https://doi.org/10.1155/2020/7051845>
 - Zoriæ J, Vukoviæ M, Lovrenski A, Samard•ija G, Višnjiæ A B and Panjkoviæ (2019) .Bone and cartilage metaplasia in calcific aortic stenosis. *Vojnosanitetski pregled* (00):107-107.DOI: <https://doi.org/10.2298/VSP190505107Z>
 - Ghudhaib K. K. (2018). “Evaluation of Ginger Rhizomes Extract Effect on Glucose Level, Lipid Profile and Liver Function in Induced Alloxan Diabetic Mice,” *Res. J. Pharm. Biol. Chem. Sci.*, vol. 9(3): 435–441. DOI: <https://doi.org/10.21123/bsj.2023.7633>
 - Al-Hussona A J and Ahmed F A (2019). Mitochondrial DNA variants from ATP8, ATP6 genes in ptients cardiac valves. *World J. Pharmacetical Res.* 8(9):1584-1592.Doi: <https://doi.org/10.51248/v43i1.2432>
 - Atique SM, Shadbolt B, Marley P, Farshid A.(2016). Association Between Body Mass Index and Age of Presentation With Symptomatic Coronary Artery Disease, *Clinical Cardiology*, 39(11):653–657. doi: 10.1002/clc.22576
 - De Blasio MJ, Ramalingam A, Cao AH, et al.(2017). The superoxide dismutase mimetic tempol blunts diabetes-induced upregulation of NADPH oxidase and endoplasmic reticulum stress in a rat model of diabetic nephropathy. *Eur J Pharmacol.*807:12–20. <https://doi.org/10.1016/j.ejphar.2017.04.026>.
 - Doney AS, Lee S, Leese GP, Morris AD, Palmer CN. (2005). Increased cardiovascular morbidity and mortality in type 2 diabetes is associated with the glutathione S transferase theta-null genotype: a Go-DARTS study. *Circulation* . 111(22):2927–2934.doi:10.1161/CIRCULATIONAHA.104.509224
 - Gómez-Marcos MA, Blázquez-Medela AM, Gamella-Pozuelo L, et al. (2016). Serum superoxide dismutase is associated with vascular structure and function in hypertensive and diabetic patients. *Oxid Med Cell Longev.* 2016:9124676. doi: [10.1155/2016/9124676](https://doi.org/10.1155/2016/9124676)
 - Hamid Ghada Salam ,. Allawi Ali A, Ghudhaib Kadhim K.(2021) Correlation of Pentosidine with Kidney Diseases in Iraqi Patients with Diabetic Nephropathy. *Iraqi Journal of Science*, Vol. 62(10): 3436-3442. DOI: [10.24996/ijs.2021.62.10.2](https://doi.org/10.24996/ijs.2021.62.10.2).
 - Han Y, Wang M, Shen J, et al.(2018). Differential efficacy of methylcobalamin and alpha-lipoic acid treatment on symptoms of diabetic peripheral neuropathy. *Minerva Endocrinol.* 43(1):11–18. doi: [10.23736/S0391-1977.16.02505-0](https://doi.org/10.23736/S0391-1977.16.02505-0).
 - Heslop CL, Frohlich JJ, Hill JS(2010). Myeloperoxidase and C-reactive protein have combined utility for long-term prediction of cardiovascular mortality after coronary angiography. *J Am Coll Cardiol* . 55(11):1102-1109.<https://www.jacc.org/doi/abs/10.1016/j.jacc.2009.11.050>

- Hopps E, Noto D, Caimi G, Averna MR(2010). A novel component of the metabolic syndrome: the oxidative stress. *Nutr Metab Cardiovasc Dis*. 20(1):72–77. [doi: 10.1016/j.numecd.2009.06.002](https://doi.org/10.1016/j.numecd.2009.06.002).
- Ibrahim Noor Alhuda Kh., Ghudhaib Kadhim K., Allawi Ali Abdulmajid Dyab and Hammoudi Faten Abdulghani.(2020). Evaluation of HE4 and IGFBPs as novel biomarkers of systemic lupus erythematosus with lupus nephritis. *Indian Journal of forensic medicine and toxicology*, 14(3): 4124-4130. [DOI: https://doi.org/10.37506/ijfmt.v14i4.12287](https://doi.org/10.37506/ijfmt.v14i4.12287)
- Ikelle L, Naash MI, Al-Ubaidi MR.(2019). Oxidative stress, diabetic retinopathy, and superoxide dismutase 3. *Adv Exp Med Biol*. 1185:335–339. [doi:10.1007/978-3-030-27378-1_55](https://doi.org/10.1007/978-3-030-27378-1_55).
- Kamel Mohammedi, Naïma Bellili-Muñoz , Stefan L Marklund , Fathi Driss, Hervé Le Nagard , Thiago A Patente, Frédéric Fumeron, Ronan Rousse, Samy Hadjadj, Michel Marre and Gilberto Velho, Mohammedi et al.(2015). Plasma extracellular superoxide dismutase concentration, allelic variations in the SOD3 gene and risk of myocardial infarction and all-cause mortality in people with type 1 and type 2 diabetes.. *Cardiovascular Diabetology*.14:845DOI [10.1186/s12933-014-0163-2](https://doi.org/10.1186/s12933-014-0163-2).
- Kliment CR, Suliman HB, Tobolewski JM, et al.(2009). Extracellular superoxide dismutase regulates cardiac function and fibrosis. *J Mol Cell Cardiol*. 47(5):730–742. [doi: 10.1016/j.yjmcc.2009.08.010](https://doi.org/10.1016/j.yjmcc.2009.08.010)
- Kowluru RA, Atasi L, Ho YS.(2006). Role of mitochondrial superoxide dismutase in the development of diabetic retinopathy. *Invest Ophthalmol Vis Sci*. 47(4):1594–1599.DOI: <https://doi.org/10.1167/iovs.05-1276>
- Mahmood AR. (2016).Estimation of oxidative stress and some trace elements in Iraqi men patients with type 2 diabetes mellitus. *Iraqi Journal of Pharmaceutical Sciences*. 25(1):1722. <https://doi.org/10.31351/vol25iss1pp17-22>.
- Mao C, Yuan JQ, Lv YB, et al.(2019). Associations between superoxide dismutase, malondialdehyde and all-cause mortality in older adults: a community-based cohort study. *BMC Geriatr*. 19(1):104. DOI:[10.1186/s12877-019-1109-z](https://doi.org/10.1186/s12877-019-1109-z)
- Shinde A, Ganu J and Naik P (2012). Effect of free radicals & antioxidants on oxidative stress. *J. Dent Allied Sci.*(1), 63–66. DOI:[10.4103/2277-4696.159144](https://doi.org/10.4103/2277-4696.159144)
- Stull LB, Leppo MK, Szweda L, Gao WD, Marban E(2004). Chronic treatment with allopurinol boosts survival and cardiac contractility in murine postischemic cardiomyopathy. *Circ Res* . 95(10):1005–1011. [doi: 10.1161/01.RES.0000148635.73331.c5](https://doi.org/10.1161/01.RES.0000148635.73331.c5)
- Surai P F and Fisinin V I (2014). Antioxidant Systems of the Body: From Vitamin E to Polyphenols and Beyond. In *Proceedings of the 35th Western Nutrition Conference*, Edmonton, Canada,(24– 25); pp. 265–277. DOI:[10.13140/2.1.1365.8563](https://doi.org/10.13140/2.1.1365.8563)
- Zeng L, Alongkronrusmee D and van Rijn R M (2017). An integrated perspective on diabetic, alcoholic and drug-induced neuropathy, etiology, and treatment in the US. *J. Pain Res*. 10: 219-228. DOI: [10.2147/JPR.S125987](https://doi.org/10.2147/JPR.S125987)
- Zhao JS, Jin HX, Gao JL, et al. (2018). Serum extracellular superoxide dismutase is associated with diabetic retinopathy stage in Chinese patients with type 2 diabetes mellitus. *Dis Markers*. 2018:1–8. [doi: 10.1155/2018/8721379](https://doi.org/10.1155/2018/8721379).
- Zhaoliang Fei, Wenxue Gao, Xiaojuan Xu, Hui Sheng, Shen Qu and Ran Cui(2021).Serum superoxide dismutase activity: a sensitive, convenient, and economical indicator associated with the prevalence of chronic type 2 diabetic complications, especially in men. *Volume 55(3): 275-281* . [doi: 10.1080/10715762.2021.1937146](https://doi.org/10.1080/10715762.2021.1937146)

Conflicts of Interest Statement.....

Manuscript title:

Evaluation of Superoxide Dismutase and their association with Diabetic neruopathy and Heart disease in Iraq populations

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Author names:

1. Zainab A. Salman

Department of Basic Science,
College of Dentistry,
University of Baghdad, Iraq

The authors whose names are listed immediately below report the following details of affiliation or involvement in an organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript. Please specify the nature of the conflict on a separate sheet of paper if the space below is inadequate.

Author names:

Zainab A. Salman

Department of Basic Science,
College of Dentistry,
University of Baghdad, Iraq

This statement is signed by all the authors to indicate agreement that the above information is true and correct (a photocopy of this form may be used if there are more than 10 authors):

Author's name (typed)

Author's signature

Date



Zainab A. Salman

2025\2\16