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(186) (18) 40 -14 228

(29) (42) .(40-31)

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E C :

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40-31

E C :

Follow-up Oxidative Stress in Pregnant Women

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ABSTRACT

The research included a study of oxidative stress in healthy and hypertension pregnant women in Ninawa governorate through measuring (18) biochemical parameters. The study was carried out on (228) women (age 14 – 40 year). The normal pregnant women (186) divided into four groups (depending on weeks gestation 1-40 weeks) and (42) pregnant women complicated by hypertension at last period (31-40 weeks). Non pregnant women (29) were included in the study as control with similar age.

The group of normal pregnant women showed significant decrease concentrations of vitamin C, vitamin E, folic acid, glutathione, uric acid, total bilirubin, zinc and iron, compared to the non-pregnant women. While there was a significant increase of : ceruloplasmin, peroxynitrite, malondialdehyde, and the activity of glutathione S-transferase.

The research also included a study of the effect of gestation period on the biochemical parameters for normal pregnancy. The results showed significant decrease with increase of gestation period of vitamin C, vitamin E, folic acid, glucose, albumin, iron, calcium and glutathione while there was significant increase of malondialdehyde, copper ceruloplasmin, and glutathione S-transferrase. The results also showed that the level of oxidative stress were high in the last gestation period (31-40 week).

Moreover, the study showed the effect of the number of children on some biochemical parameters for normal pregnancy at last gestation period. The results revealed that there were direct correlation between the number of children and the concentrations of peroxynitrite and inverse correlation with the concentrations of calcium and the activity of superoxide dismutase.

On the other hand, the group of women pregnant which have complication with hypertension had significant decrease concentrations of vitamin C, vitamin E, folic acid, glutathione, zinc and the activity of superoxide dismutase, and significant increase in the concentrations of uric acid, copper, peroxynitrite and in the activity of glutathione S-transferase compared to normal pregnant women.

Keywords: Oxidative stress, Pregnancy, Ninawa, Antioxidants, Oxidants, Hypertension.

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Pregnancy

(Adiga and Adiga, 2009)

Superoxide anion radical



.(Robinson *et al.*, 2008)

Reactive oxygen species (ROS)

Reactive nitrogen species (RNS)

.(Radak, 2000; Poston and Raijmakers, 2004; Idogun *et al.*, 2008)

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(18)

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(228)

(186) ()) 4

(29)

42 (40-1

(10 -8) Fasting

(10-8)

(25 °C) Plain tube
(4000 x g) 15 Centrifuge

Micropipette

.(1)

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(20-11)

(10-1)

.(40-31)

(30-21)

.(40-31)

Mean

SPSS

(t-test) t

Standard error(SE)

Significant

($P \leq 0.05$)

(P value) P

Anova test

Duncan test

($P > 0.05$)

Indrayan and)

.(Sarmukaddam, 2001

المصدر	الطرائق المستخدمة	المتغيرات المقاسة
Varley <i>et al.</i> , 1980	Emmeric – Engle reaction	فيتامين E Vitamin E
Stanley <i>et al.</i> , 1979	Oxidation method	فيتامين C Vitamin C
Lakshmaiah and Ramasastry, 1975	Microbiological measurement	حامض الفوليك Folic acid
Burits and Ashoowed, 1999	Tungsten blue	حامض اليوريك Uric acid
Walters <i>et al.</i> , 1970	Diazo method	البليروبين الكلي Total Bilirubin
		البليروبين المقترن Conjugated Bilirubin
Trinder, 1969	Glucose oxidation method	الكلوكوز Glucose
Doumas and Watson, 1971	Bromocresol green method	الألبومين Albumin
Sunderman and Nomato, 1970	Oxidation method	السليروبلازمين Ceruloplasmin
Sedlak and Lindsay, 1968	Modified procedure utilizing Ellmans reagent	الكلوتاثيون Glutathione
D'Haese <i>et al.</i> , 1992	Atomic absorption spectrophotometry	الزئبق Zinc
		النحاس Copper
Hennesy <i>et al.</i> , 1984	Colorimetric method	الحديد Iron
Moorehead and Briggs, 1974	o – Cresolphthalein method	الكالسيوم Calcium
Guidet and Shah, 1989	Thiobarbituric acid modified procedure	مالوندايالديهيد Malondialdehyde
Vanuffelen <i>et al.</i> , 1998	phenol method	بيروكسي نيتريت Peroxynitrate
Brown and Goldstein, 1983	Modified photochemical nitroblue tetrazolium (NBT)	إنزيم سوبر اوكسيد ديسميوتيز Superoxide dismutase
Habig <i>et al.</i> , 1974	1-chloro-2,4- dinitrobenzene(CDNB) conjugation with glutathione	إنزيم كلوتاثيون S- ترانسفيريز Glutathione S-transferase

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(Horne *et al.*, 1970; Lind *et al.*, 1984; Choi *et al.*, 2002; Anetor *et al.*, 2003; Iqbal *et al.*, 2004; Khetsuriani *et al.*, 2004; Ejezie *et al.*, 2004; Eradze *et al.*, 2005; Patil *et al.*, 2006; Hassan and Onu, 2006; Isber, 2006; Rukmini, *et al.*, 2009; Mackillop and Williamson, 2010).

C E

E

Lipophilic

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E

E

C

E

E

E

.(Patil *et al.*, 2006; Mohanty *et al.*, 2006)

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(P)	(186=)		(29=)		
0.82	6.8	28.2	4.6	27.89	()
0.04*	0.05	0.126	1.6	0.912	(100/) C
0.02*	0.37	4.2	.30	0.747	(100/) E
0.002*	0.72	4.6	1.9	8.4	(/)
0.05*	0.2	2.2	0.8	3.19	(100/)
0.042*	0.11	0.7	0.16	0.85	(100/)
0.144	0.08	0.18	0.048	0.27	(100/)
0.25	10.44	90.48	5.9	80.9	(100/)
0.05*	0.63	3.4	0.43	3.7	(100/)
0.0001**	127.36	337.2	53.7	215.64	(/)
0.02*	1.9	8.7	2.8	13.2	(/)
0.03*	0.003	0.021	0.004	0.0266	(/)
0.28	0.002	0.0118	0.0017	0.0097	(/)
3*030.	15.8	105.7	16.33	137.48	(100/)
0.12	1.52	6.5	1.44	8.7	(100/)
0.003*	0.82	5.17	0.23	2.31	(/)
0.015*	6.13	.886	9.24	.4480	(/)
0.16	0.0024	0.02	0.0064	0.013	
0.02*	5.3	28.8	5.54	15.52	(/) -S

. p≤0.05

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.p<0.001

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Hemodilution

.(Higgins *et al.*, 2000)

.(Halliwell and Gutteridge, 1985; Bacq *et al.*, 1996)

)

(Prevention antioxidants

.(Iqbal *et al.*, 2004)

(Cp.)

Fe⁺³

Transferrin

Fe⁺²

Ferritin

Ferroxidase

.(Khetsuriani *et al.*, 2004)

SOD

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Superoxide anion radical

.(Saczko *et al.*, 2002)

(Tam and Lao, 2002)

(Choi *et al.*, 2000)

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.(Kovacs and Kronenberg, 1997)

MDA

.(Gupta *et al.*, 2009)

(Choi *et al.*, 2002)

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(2)

-S

Detoxification enzyme

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Glutathione

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.(Jacob, 1995; Woodside and Young, 2001; Al-Gubory *et al.*, 2004) peroxidase (GPx)

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(3)

E C :

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(Lind *et al.*,1984; Choi *et al.*, 2000; Anetor *et al.*, 2003; Eradze *et al.*, 2005; Patil *et al.*, 2006; Hassan and Onu, 2006; Isber, 2006; Mackillop and Williamson, 2010).

.ANOVA test

(P)	(31) (128=)		(30-21) (18 =)		(20-11) (23=)		(10-1) (17=)		(29=)	
0.1	4.04	29.52	5.62	28.8	3.2	27.3	3.76	.1162	4.6	27.89
0.02*	0.02	0.082	0.0033	0.142	0.035	0.21	0.04	0.135	0.10	0.912
0.012	0.07	0.46	0.11	0.68	0.08	0.65	0.05	0.55	0.10	0.747
0.04*	0.677	4.31	1.2	4.77	2.9	5.5	0.6	5.6	1.9	8.4
0.52	0.4	4.17	0.87	3.26	0.2	2.58	0.13	2.2	0.8	3.19
0.17	0.21	0.766	0.17	0.5	0.1	1.11	0.16	0.87	0.16	0.85
0.61	0.05	0.25	0.06	0.24	0.07	0.31	0.02	0.19	0.048	0.27
0.001*	12.6	73.6	19.3	75.5	10.7	118.6	6.8	72	5.9	80.9
0.001*	0.9	3.34	1.71	5.1	1.1	3.4	0.75	3.4	0.43	3.7
0.0001**	74.55	320.6	71.45	345.37	78.6	404.4	69.2	292.4	53.7	215.6
0.044*	0.84	4.72	0.77	5.1	0.85	6.4	1.5	7.5	2.8	13.2
0.15	0.0051	0.0213	0.005	0.018	0.0048	0.021	0.0045	0.022	0.004	0.026
0.001*	0.0035	0.0155	0.006	0.0143	0.0046	0.012	0.0052	0.0121	0.0017	0.009
0.001*	18.45	89.62	22.88	105.4	20.1	110.7	14.5	91.0	16.33	137.4
0.001*	1.07	6.12	1.25	6.64	1.8	8.5	1.7	7.5	1.44	8.7
0.001*	1.4	7.6	1.22	5.36	1.02	6.44	1.13	5.45	0.23	2.31
0.145	11.7	90.1	10.92	85.8	8.92	85.86	7.3	88.35	9.24	80.44
0.30	0.002	0.0183	0.001	0.007	0.002	0.0185	0.0028	0.0235	0.0064	0.013
0.001*	6.3	30.4	7.7	37.13	0.49	27.6	3.8	30.35	5.54	15.52

. p≤0.05

.p<0.001

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Phosphorlyase

.(Rall and Sutherland, 1962)

(31)

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.(4) (7)

(6-4)

(3-1)

(4)

SOD

.(Sentman *et al.*, 2006)

(SOD)

(NBT)

O₂⁻

(Brown and Goldstein, 1983)

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:4

.ANOVA test

(P)									
	7		6-4		3-1				
	14=		45=		41=		28=		
0.001**	4.54	33	4.8	27.53	5.3	24.29	3.7	20.32	العمر (سنة)
0.4	0.003	0.047	0.006	0.06	0.0051	0.08	0.005	0.09	فيتامين C (ملغم/100 مل)
0.4	0.05	0.38	0.28	0.33	0.06	0.48	0.2	0.62	فيتامين E (ملغم/100 مل)
0.4	1.2	3	0.8	4.3	1.6	4.8	1.9	7.1	حامض الفوليك (نانوغرام/مل)
0.6	0.3	3.5	0.47	3.56	0.6	5.6	0.63	3.6	حامض اليوريك (ملغم/100مل)
0.4	0.03	0.53	0.052	0.7	0.053	0.7	0.0933	1.1	البيرروبين الكلي (ملغم/100مل)
0.2	0.07	0.12	0.1	0.22	0.012	0.16	0.06	0.5	البيرروبين المقترن (ملغم/100مل)
0.16	13.2	65.8	22.1	73.1	27.7	75.8	20.5	80.6	الكلوكوز (ملغم/100مل)
0.9	0.9	3.3	0.96	3.1	0.9	3.41	0.8	3.5	ألبيومين (غم/100مل)
0.23	94.4	360.8	100.5	325.4	99.1	306.6	69.8	289.6	السليروبلازمين (ملغم/لتر)
0.5	0.4	3	0.8	4.2	0.6	5.1	0.9	7.5	الكلوتاتايون (مايكرومول/لتر)
0.7	0.003	0.018	0.003	0.021	0.001	0.023	0.004	0.021	الخاصين (مايكروغرام/مل)
0.29	0.0017	0.012	0.004	0.0166	0.001	0.016	0.003	0.016	النحاس (مايكروغرام/مل)
0.6	17.11	74	21.2	83.8	20.6	88.5	30.2	111.7	الحديد (مايكروغرام/100مل)
0.05*	1.5	4.3	1.4	6.4	0.61	6.3	1.1	7.6	الكالسيوم (ملغم/100مل)
0.8	1.6	8.11	2.1	8.12	1.2	6	1.3	6.81	المالوندايالديهيد(مايكرومول/لتر)
0.05*	22	94.3	18.9	90.4	13.3	84.5	15.6	85	البيروكسي نيتريت (مايكرومول/لتر)
0.01*	0.006	0.032	0.003	0.018	0.0012	0.01	0.001	0.0084	إنزيم السوبر اوكسيد ديسميوتيز
0.32	5.2	37.5	7.8	31.2	6.2	27.5	3.4	25	كلوتاتايون-S-ترانسفيريز (وحدة عالمية/لتر)

p≤0.05

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** فرق معنوي عن مجموعة السيطرة عند مستوى p<0.001

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C E

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(5)

C :

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: -S

(Wilson *et al.*, 1994; Many *et al.*, 2000; Pasoglu *et al.*, 2004; Khetsuriani *et al.*, 2004; Robert *et al.*, 2005; Isber, 2006; Dordevic *et al.*, 2007; Mohan and Venkataramana, 2007; Punthumapol and Kittichotpanich, 2008; Rukmini *et al.*, 2009)

C

(Khrab, 2000)

(Moat *et al.*, 2006 ; Joshi *et al.*, 2001).

NO

Endothelial cells

Xanthine oxidase

.(Many *et al.*, 2000; Punthumapol and Kittichotpanich, 2008)

:5

(40-31)

(P)	42=		128=		
	SD	Mean	SD	Mean	
0.07	7.2	28.71	4.04	29.52	()
0.049*	0.013	0.0744	0.02	0.082	(100/) C
0.5	0.03	0.03	0.07	0.46	(100/) E
0.02*	1.5	3.2	0.677	4.31	(/)
0.038*	0.5	5.2	0.4	4.17	(100/)
0.9	0.1	0.87	0.21	0.766	(100/)
0.44	0.05	0.3	0.07	0.25	(100/)
0.4	11.6	100.1	12.6	73.6	(100/)
0.9	1.01	3.23	0.9	3.34	(100/)
0.99	99.4	368.44	74.55	320.6	(/)
0.01*	0.5	3.1	0.84	4.72	(/)
0.016*	0.003	0.0173	0.0051	0.0213	(/)
0.01*	0.0016	0.0162	0.0035	0.0155	(/)
0.9	17.5	72.7	18.45	89.62	(100/)
0.8	2.3	6.13	1.07	6.12	(100/)
0.63	2.1	8.32	1.4	7.6	(/)
0.05*	15.3	105.46	11.7	90.1	(/)
0.021*	0.01	0.0382	0.002	0.0183	
0.05*	11.1	.2745	6.3	30.4	(/) -S

. p≤0.05

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Glutathion reductase (GRd)

-S

(Al-Gubory *et al.*, 2004)

SOD

.(Tsukimori *et al.*, 2005; Hung, 2007; Guzik *et al.*,2009)

SOD

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SOD Non- glucosylated Glucosylated

-S

(Chaudhari *et al.*, 2003)

-S

(o-quinones) -

.(Marinho *et al.*, 2005)

.(2008) .

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