



:

.(Capel, 1988)

(Park and Pariza,

2007; Kramer et al., 1998; Chin et al., 1994

).(Nevin and Rajamohan, 2004)

(Scavengers)

.Reactive Oxygen Species (ROS)

(Free Radicals)

( ) (Levy et al., 1998)

(Low Density

(Lipid

Lipoprotein cholesterol [LDL-c])

(Ferrari et al., 1992) peroxidation)

).(Jun-Jun et al., 2000)

(Eder and Kirchgessner, 1997)

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(Parthasarathy

(DNA)

.et al., 1998)

(Conjugated Linoleic Acid [CLA])

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(Pariza et al., 2001; Belury, 2003)

.(Kang et al., 2003)

Flintoff-Dye and Omaye (2005)

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.(Nevin and Rajamohan , 2006)

.(Mild)

(Provitamin A)

.(Nevin and Rajamohan, 2008)

(Philippine National Standard [PNS])

.(BPS, 2004)

(Hui, 1996)

(Nevin and Rajamohan, 2008)

(Medium Chain

(German and Dillard,

Fatty acid [MCFA])

2004)

## Conjugated Linoleic Acid (CLA)

Cognis

(Tonalin® TG 80) [ ]

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## Virgin Coconut Oil (VCO)

Certified Organic Virgin Coconut Oil

(<http://www.virgincoconutoil.co.uk>)

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.([www.coconut-connections.com](http://www.coconut-connections.com))

## Experimental Animal Diet

(Reeves, 1997)

(Dyets, Inc., Bethlehem, PA, USA)

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(Reeves, 1997) : \*

### Animals and Experimental Protocol

Wister-albino ( )

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(Mettler

.PM2000, Switzerland)

(Diethyl ether)

(Serum)

.(Vacuette)

### **Biochemical Analysis Methods**

#### **Antioxidant Enzymes Estimation**

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#### **Glutathion Reductase (GR)**

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(Goldberg and Spooner, 1983)

Biodiagnostic, Cat. No. GR 25 22, Cairo,

Visual Biomerieux

Egypt.

#### **Superoxide Dismutase (SOD)**

(Nishikimi et al., 1972)

Biodiagnostic, Cat. No. SD 25 20

.Visual Biomerieux



## Catalase Assay (CAT)

(Aebi, 1984)

Visual Biomerieux

Biodiagnostic, Cat. No. CA 25 16.

## Lipid Profile Estimation

### Total Cholesterol (TC)

(Richmond, 1973)

Jhonson & Jhonson

Ortho-Clinical Diagnostic

Vitos 250

### High Density Lipoprotein Cholesterol

(HDL-c)

(Lopez-Virella et al.,

Ortho-Clinical Diagnostic

1977)

Vitos 250

### Low Density Lipoprotein Cholesterol

(LDL-c)

(McNamara et al.,

Diagnostic

1995; Cohen, 1995)

Cobas Integra 400 plus

.Roche, Mannheim, Germany

. (LDL-c)

### Very Low Density Lipoprotein

Cholesterol (VLDL-c)

(Viikari, 1976;

BioVision

Widhaim and Pakosta, 1991)

Visual Biomerieux

Research Product, CA94043, Mountain View, CA, USA.

.(VLDL-c)

**Triglycerides (TG)**

(Fassati and Prencipe, 1982)

Vitos 250

Ortho-Clinical Diagnostic

.TG

**Malondialdehyde**

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(Ohkawa et al., 1979)

Visual Biomerieux

Biodiagnostic, Cat. No. MD25 28

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.(SAS, 1997)

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(P&lt;0.05)

(P&lt;0.05)



/ ، ± ، ( )  
 . / ، ± ،

(U/ml)	(U/ml)	(U/L)	
، ± ، <sup>g</sup>	، ± ، <sup>h</sup>	، ± ، <sup>i</sup>	
، ± ، <sup>f</sup>	، ± ، <sup>g</sup>	، ± ، <sup>h</sup>	CLA* ،
، ± ، <sup>e</sup>	، ± ، <sup>f</sup>	، ± ، <sup>g</sup>	CLA
، ± ، <sup>de</sup>	، ± ، <sup>e</sup>	، ± ، <sup>f</sup>	CLA ،
، ± ، <sup>d</sup>	، ± ، <sup>d</sup>	، ± ، <sup>e</sup>	CLA
، ± ، <sup>e</sup>	، ± ، <sup>c</sup>	، ± ، <sup>e</sup>	VCO**+CLA ،
، ± ، <sup>c</sup>	، ± ، <sup>c</sup>	، ± ، <sup>d</sup>	VCO+CLA
، ± ، <sup>b</sup>	، ± ، <sup>b</sup>	، ± ، <sup>c</sup>	VCO+CLA ،
، ± ، <sup>b</sup>	، ± ، <sup>a</sup>	، ± ، <sup>b</sup>	VCO+CLA
، ± ، <sup>a</sup>	، ± ، <sup>a</sup>	، ± ، <sup>a</sup>	VCO

، ، >

: CLA \*

: VCO \*\*

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Nevin and Rajamohan (2006)

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(Noguchi

.and Niki, 1999)

( )

( , )

(HDL-c)



(mg/dl)	(mg/dl)	(mg/dl)	(mg/dl)	(mg/dl)	
, ± , <sup>b</sup>	, ± , <sup>bc</sup>	, ± , <sup>abcd</sup>	, ± , <sup>a</sup>	, ± , <sup>bc</sup>	
, ± , <sup>a</sup>	, ± , <sup>a</sup>	, ± , <sup>a</sup>	, ± , <sup>a</sup>	, ± , <sup>a</sup>	CLA* ,
, ± , <sup>c</sup>	, ± , <sup>b</sup>	, ± , <sup>abc</sup>	, ± , <sup>a</sup>	, ± , <sup>c</sup>	CLA
, ± , <sup>bc</sup>	, ± , <sup>b</sup>	, ± , <sup>ab</sup>	, ± , <sup>a</sup>	, ± , <sup>c</sup>	CLA ,
, ± , <sup>b</sup>	, ± , <sup>b</sup>	, ± , <sup>bed</sup>	, ± , <sup>a</sup>	, ± , <sup>c</sup>	CLA
, ± , <sup>d</sup>	, ± , <sup>cde</sup>	, ± , <sup>cde</sup>	, ± , <sup>a</sup>	, ± , <sup>abc</sup>	VCO**+CLA ,
, ± , <sup>d</sup>	, ± , <sup>de</sup>	, ± , <sup>de</sup>	, ± , <sup>a</sup>	, ± , <sup>ab</sup>	VCO+CLA
, ± , <sup>c</sup>	, ± , <sup>bcd</sup>	, ± , <sup>abcd</sup>	, ± , <sup>a</sup>	, ± , <sup>abc</sup>	VCO+CLA % ,
, ± , <sup>d</sup>	, ± , <sup>e</sup>	, ± , <sup>abcd</sup>	, ± , <sup>a</sup>	, ± , <sup>abc</sup>	VCO+CLA
, ± , <sup>e</sup>	, ± , <sup>e</sup>	, ± , <sup>e</sup>	, ± , <sup>a</sup>	, ± , <sup>c</sup>	VCO

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: CLA\*

: VCO \*\*

( ) (LDL-c)

(P&lt;0.05)

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( / , ± , )

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(VLDL-c)

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(P≤0.05)

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(r=0.558)

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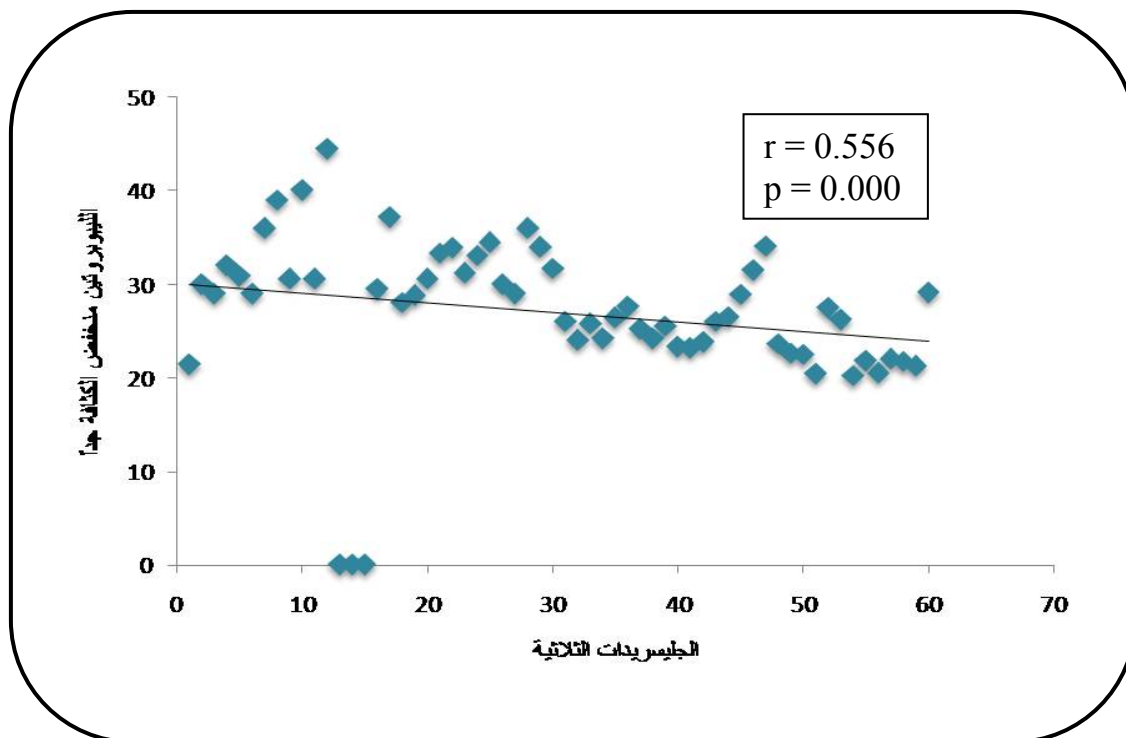
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(P≤0.05)

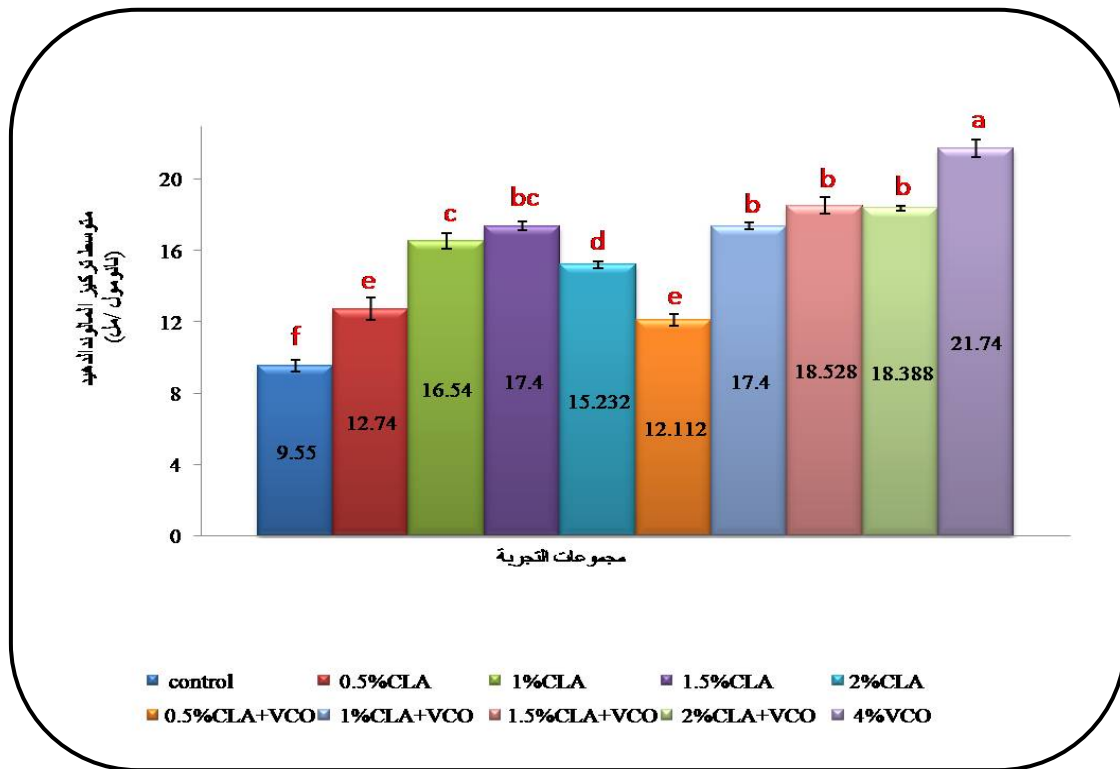
/ , ± ,

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CLA :  
VCO :

(Cooper et al., 2008)

(LDL-c) (HDL-c)

(Akahoshi et al., 2003)

(HDL-c)  
(Rahman et al., 2001)  
(Risérus et al., 2002)  
(VLDL-c, HDL-c, LDL-c)  
(Flintoff-Dye and Omaye, 2005)  
(*in vivo*)  
(*in vitro*) Flintoff-Dye and Omaye  
(LDL-c)  
(Pro-oxidant)  
.(Riserus et al., 2004)

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## A Comparative Study on the Effect of Conjugated Linoleic Acid and Virgin Coconut Oil on Antioxidative Enzymes and lipid profile in Rats

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**ABSTRACT:** The purpose of this study was to evaluate the effect of conjugated linoleic acid (CLA), virgin coconut oil (VCO) and their mixtures on antioxidant enzymes and lipid profile in rats. Sixty male Wister-albino rats (eight weeks old and weight  $110 \pm 10$  g) were randomly assigned to ten groups of six rats in each one. The first group was fed a control diet containing 4% soy bean oil. Four groups were fed different concentrations (0.5, 1.0, 1.5 and 2.0%, each increased to 4% using soy bean oil ) of CLA plus soy oil, the other four groups were fed different concentrations of CLA (0.5, 1.0, 1.5 and 2.0%, each increased to 4% using soy bean oil) plus VCO and the last group was fed VCO (4%) alone.

Results showed an increase in the activity of antioxidant enzymes (glutathione reductase, superoxide dismutase and catalase) in rats fed CLA alone and in mixture with VCO, and the differences of the activities of these enzymes were significant ( $P < 0.05$ ) among all groups. Moreover, such differences were also significant among studied groups and the control group. The highest activities of these enzymes were noticed in groups fed VCO alone.

CLA, VCO and their mixtures had generally insignificant effects in total cholesterol and high-density lipoprotein cholesterol (HDL-C) in the serum of rats. However, VCO alone decreased significantly ( $P < 0.05$ ) the level of low-density lipoprotein cholesterol (LDL-C) and the very low- density lipoprotein cholesterol (VLDL-C) in serum of rats compared to the control group. On the other hand, the different concentrations of CLA either alone or as mixtures with VCO had no significant effect in these two indicators. Furthermore, VCO alone or as a mixture with CLA significantly decreased ( $P < 0.05$ ) the concentration of triglyceride (TG) in the serum of rats compared to the control group. However, the highest decrease in TG was noticed in the group fed VCO alone. On the other hand, the different concentrations of CLA alone had generally no effect in the concentration of TG in the serum of rats.

Rats fed VCO alone had the highest concentration of malondialdehyde in the serum, whereas the lowest concentration of malondialdehyde was in the serum of the control group and there was a significant difference between these two groups. Moreover, there was a significant difference in the concentration of malondialdehyde between these two groups and the other groups in this study.

In conclusion, the results suggest that CLA alone or in combination with VCO increased the activity of antioxidant enzymes in serum of rats. However, the effect of CLA and VCO alone or in combination in plasma lipids was variable.

**Key words:** CLA, VCO, antioxidant enzymes, lipid profile.