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ORIGINAL ARTICLE

Protective Role of Folic Acid in Oxidative Stress Induced by Methionine over Load on Lipids and Lipoproteins Levels in Female New Zealand Rabbits

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ABSTRACT

Objectives: The aim of this study was examine to know protective role of folic acid in oxidation stress that results by over load of methionine.

Methods: In these study used 18 female of New Zealand rabbits . the working including measuring the TC,TG,HDL,LDL and VLDL levels in blood after intubated over load of methionine and compered with control.

Results: The results show that a significant decrease ($p<0.05$) in HDL levels and a significant increase ($p<0.05$) in TC, TG, LDL and VLDL in G2 compared with G1 and G3.

Conclusion: From the results of the present study , we can be concluded that methionine overload state effects on lipids and lipoproteins and folic acid have protective role in oxidative stress that resulted by over load methionine.

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INTRODUCTION

Methionine is essential amino acid witch contain sulfur , it is found in rice , cazain, cheese , eggs , meet and fish[1]. Methionine considers essential source of sulfur and many compounds necessary for body and sulfur have important role in (lecithin) production witch it important in decrease the lipids in liver and methionine have important role in (urolithiasis)[2], and it is source of homocysteine in blood and over load of methionine lead to Hyperhomocystinemia (HHcy). HHcy lead to coronary arteries disease and myocardial infraction by oxidative stress[3]. Cholesterol is a fat, waxy substance and it is found in the cells of the body and it important to make hormones ,vitamin D and help in digest foods[4]. Cholesterol is made in the body and also found in animals sources egg yolks, meat and cheese[5]. Triglyceride (TG) is a type of fat and found in adipose

tissue , and it Exogenous (in foods)and Endogenous (in liver)[6], some studies suggested that TC and TG are risk factors to atherosclerosis[7]. lipoproteins are hydrophobic particles have important role in transition the fats in the body. In study on rats which eat food with high ration of methionine for 4 weeks lead to increase in TC,TG and LDL concentration[8]. The Folic acid is a vitamin found in the food and it doesn't synthesis in the body, folic acid is a hydrophilic vitamin and it (co-enzyme) in many reaction[9], and folic acid have role in methionine synthesis from homocystine and B12 , and deficiency of folic acid lead to decrease in methionine levels in blood and that causes HHcy[10].

MATERIALS AND METHODS

This study was carried out in the department of Biology from December, 2009 to January, 2010. In this study 18 female of new Zealand rabbits were divided into three groups (6/group) and were intubated for one month as follows: (control) G1, wich were intubated tap water ordinary and animals in treated group G2 were intubated with 100 mg /kg .B.W of methionine, while animals in third group G3 were intubated with 100 mg /kg .B.W of methionine orally plus oral intubation of folic acid 0.07mg/kg .B.W , and collection the fasting blood samples from this groups each 10 days for measuring: Total cholesterol (TC), Triacylglycerol (TG), Low density lipoprotein (LDL), High density lipoprotein (HDL) and very density lipoprotein (VLDL).

TC, TG, LDL, HDL and VLDL were measured each 10 days in groups after intubation methionine and methionine plus folic acid for 30 days.

Serum (TC) level were measured by using. (cholesterol kit BioLABO company, France)[11]. Serum (TG) level were measured by using (Triglyceride kit BIOLABO company, France)[12,13]. Serum (HDL-c) level were measured by using (Rondo.United Kingdom laboratories Ltd,co.Antrim) kit[14]. Serum (LDL-c) level were measured by using: LDL=TC-(HDL+TG/5)[15].

The mean± Std. Error of all parameters measured from groups G1,G2 and G3 were determined with TC,TG, HDL,LDL and VLDL.

RESULTS

Table 1 shows a significant increase (P<0.05) in TC concentration in G2 compared with G3 and G1, and significant decrease (P<0.05) in TC concentration in G3 compared with G2 within the time.

Table 1: **Show affects of methionine and folic acid intubation on levels of (TC) mg/dL in New Zealand females rabbits.**

Time	Groups		
	Control G1	**G2**	**G3**
After 10 days	130.0±0.365 Aa	209.33±1.706 Ba	197.33± 0.615 Ca
After 20 days	130.5± 0.342 Aa	213.0± 1.291 Ba	191.67± 0.615 Cb
After 30 days	130.0± 0.365 Aa	230.83±0.553 Bb	185.33± 1.116 Cc
Total	130.17± 0.202 A	217.72± 2.380 B	191.44± 1.269 C

Mean± Std. Erro. The capital latters refers to horizontal Significant at(p< 0.05). The small latters refers to vertical Significant at (p< 0.05).

Table 2 appearances a significant increase (P<0.05) in TG concentration in G2 compared with G3 and G1, and significant decrease (P<0.05) in TG concentration in G3 compared with G2 within the time.

Table 2: **Affects of methionine and folic acid intubation on levels of (TG) mg/dL in New Zealand females rabbits.**

Time	Groups		
	Control G1	**G2**	**G3**
After 10 days	129.67±0.422 Aa	187.83±0.307 Ba	180.0±0.258 Ca
After 20 days	130.83±0.307 Aa	191.0± 0.517 Bb	160.5±0.224 Cb
After 30 days	129.67±0.333 Aa	199.0± 0.365 Bc	170.5±0.224 Cc
Total	130.06±0.236 A	192.61± 1.164 B	170.33±1.935 C

Mean± Std. Erro.The capital latters refers to horizontal Significant at (p< 0.05). The small latters refers to vertical Significant at (p< 0.05).

Table 3 displays a significant decrease (P<0.05) in HDL concentration in G2 compared with G3 and G1, and significant increase (P<0.05) in HDL concentration in G3 compared with G2 within the time.

Table 3: **Affects of methionine and folic acid intubation on levels of (HDL) mg/dL in New Zealand females rabbits.**

Time	Groups		
	Control G1	**G2**	**G3**
After 10 days	30.17±0.307 Aa	18.5± 0.224 Ba	20.83± 0.307 Ca
After 20 days	30.33±0.615 Aa	14.83± 0.307 Bb	23.5 ± 0.428 Cb
After 30 days	30.50±0.224 Aa	12.17± 0.833 Bc	24.67 ± 0.211 Cc
Total	30.33±0.229 A	15.17± 0.692 B	23.0 ± 0.428 C

Mean± Std. Erro.The capital latters refers to horizontal Significant at (p< 0.05). The small latters refers to vertical Significant at (p< 0.05).

Table 4 shows a significant increase (P<0.05) in LDL concentration in G2 compared with G3 and G1, and significant decrease (P<0.05) in LDL concentration in G3 compared with G2 within the time.

Table 4: **Affects of methionine and folic acid intubation on levels of (LDL) mg/dL in New Zealand females rabbits.**

Time	Groups		
	Control G1	**G2**	**G3**
After 10 days	73.9±0.198 Aa	153.267±0.188 Ba	140.45±0.623 Ca
After 20 days	74.76±0.488 Aa	160.4± 1.477 Bb	135.933±0.82 Cb
After 30 days	73.65±0.489 Aa	178.867±0.574 Bc	126.567±1.21 Cc
Total	74.106±0.253 A	164.178±2.727 B	134.317±1.48 C

Mean± Std. Erro.The capital latters refers to horizontal Significant at (p< 0.05). The small latters refers to vertical Significant at (p< 0.05).

Table 5 appearances a significant increase (P<0.05) in VLDL concentration in G2 compared with G3 and G1,

and significant decrease (P<0.05) in VLDL concentration in G3 compared with G2 within the time.

Table 5: **Affects of methionine and folic acid intubation on levels of (VLDL) mg/dL in New Zealand females rabbits.**

Time	Groups		
	Control G1	**G2**	**G3**
After 10 days	26.033±0.166 Aa	37.567±0.061 Ba	36.05±0.095 Ca
After 20 days	26.167±0.061 Aa	38.2± 0.115 Bb	32.10±0.044 Cb
After 30 days	25.983±0.110 Aa	39.80± 0.073 Bc	34.10±0.044 Cc
Total	26.061±0.068 A	38.522± 0.232 B	34.083±0.392 C

Mean± Std. Erro.The capital latters refers to horizontal Significant at (p< 0.05). The small latters refers to vertical Significant at (p< 0.05).

Discussion

The results show that oral tubated of 100mg/kg of methionine daily for female rabbits for 30 days due to significant increased (p<0.05) in TC, TG, LDL and VLDL concentration and significant decrease (P< 0.05) in HDL concentration and this results agreement with[16,17] that found over load of methionine due to HHcy and that may be responding to Hyperlipidemia that observed in this study by increase in cholesterol synthesis by translation and transcription of 3- hydroxyl-3-methylgluaryl co enzyme A reductase , and HHcy may be dysfunction of nitric oxide (No) by decrease in cysteine concentration in plasma[18] and by oxidative stress that results from HHcy may due to stress of endoplasmic reticulum and increase in gene expression of strol on endoplasmic reticulum membrane and that due to high levels of TC,TG and VLDL[19]. Hypercholesterolemia that induced by over load methionine may be due to mutation in LDL receptors and that due to decrease in this receptors and increase in LDL levels[20], and HDL concentrations in serum correlated oppositely with levels of TG and LDL in serum, HDL play role in transport cholesterol from tissues to liver and elevated in LDL levels lead to reduce in HDL concentrations, HHcy may be due to decrease in HDL concentrations in serum by reduce activity of (apo A-1 ,ABC A1) that responding to produce HDL[21].

Folic Acid Role: The results show the oral intubation of 0.07 mg/kg for 30 days lead to Hypocholesterolemic state (decrease in TC,TG,LDL and VLDL levels) and that by folic acid may be play role in reduce Hcy in plasma and reduce free radicles prodaction[22] and folic acid may be lead to re- methylation of Hcy and methionine production[23]. Folic Acid may be effected on (5- deoxy adenoyl colamine) that responding to produced (Syccinyl CoA) from (L- methyl malonyl coA) and that reaction lead to release energy from lipids[24], Folic Acid decrease TC and TG levels by increase lipoprotein lipase activity[25].

Conclusions

From the results of the present study, we can be concluded that methionine overload state effects on lipids and lipoproteins and folic acid have protective role in oxidative stress that resulted by over load methionine.

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