## COMPARATIVE STUDY OF HYPOCHOLESTEROLEMIC EFFECT ON TAURINE ANDSIMVASTATIN IN MALE RATS

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#### ABSTRACT

This study was conducted to investigate the effect of Taurine as hypocholesterolemic agent and compare with the results of simvastatin drug on male rats. The experiment consisted of 36 adult male rats (Rattus norvegicus) weighting range 170 -200 gm divided into six groups (six for each), the control group were fed on standard ration for four weeks while cholesterol group fed on standard ration and (10gm/kg/ration) cholesterol. The third group treated by taurine (0.7mg/day/rat) in drinking water while fourth group treated by simvastatin (0.05 mg/day/rat) in drinking water during animal fed on cholesterol in standard ration for 4 weeks. The fifth and six group animals fed standard ration and cholesterol for 4 weeks and then treated with taurine and simvastatin (0.7 mg and 0.05 mg/day/rat) in drinking water for 4 weeks respectively.

At the end of study, the rats were sacrificed and blood serum was collected .The evaluation of total cholesterol, LDL-cholesterol, VLDL- cholesterol, HDL- cholesterol and triglyceride were done and also AST and ALT were measured.

The results revealed there were a significant decreasing in the lipid profile parameters (TC, TG, LDL-C and VLDL-C) and noted there were a significant increasing in HDL-C parameter of taurine treated group and simvastatin treated group when compared with control and high cholesterol groups. Taurine showed better effect on hepatic enzyme activities and lipid profile parameters when compared with simvastatin treated groups.

## **INTRODUCTION**

The deleterious effect of high cholesterol diet appeared as an indicator of harassing an individual's weight gain and impact on his daily lives as well as his life threatened.Globally, around 39% of adults aged 25 and above had high cholesterol and a third of ischemic heart disease is attributable to high cholesterol(13). This problem cause several diseases, the most important are atherosclerosis, myocardial infarction, stroke, and heart attack (16 and 23). The most famous drug used to reduce the total cholesterol level and other lipid profile parameters is a statin group (5).one of them simvastatin, also known as HMG-COA reductase inhibitors which limits cholesterol biosynthesis in addition simvastatin reduces VLDL and TG and increase HDL-C. Simvastatin like all medication, can cause side effects, some of the main side effects of simvastatin are myopathy, increased blood sugar or type 2 diabetes, in addition neurological side effects and there is evidence of harm to a baby when taken by pregnant woman (4,24 and 25). Recently, the medication in the world tended to alternative the drugs and chemicals by the natural extraction and materials (7,26). One of supplements is taurine, or 2-aminoethanesulfonic acid, organic acid widely located in the tissues especially animal tissues(8 and 10). It is a major bulk of bile and can be found in the intestine and calculated for up to 0.1% of total human body weight (17, 19) also they found in the animal tissues such as the retina, brain, liver, skeletal muscle, myocardium, platelets, and leukocyte(3) .Taurine had many physiological functions may give effects on the organs and other tissues, represented byneurotransmitter (inhibitory), cell membrane stabilizing (21), fat metabolism and antioxidant (18). The most important function for taurine that established by many researches, Last one done by (1).

#### **MATERIAL AND METHODS**

Thirty six male rats were used, their weight between 170-200gm in the present study. Which divided into 6 groups (six for each group). These Rats were controlled in Coops (stainless steel) in animal house with controlled temperature  $(25\pm 5^{\circ})$  and humidity (50-60 %) in Laboratory Animal House .They were given free access to the different dietary formalizations and water ad labium for 4 weeks.

The control group were fed on standard ration for four weeks and cholesterol group fed on standard ration and (10gm/kg/ration) cholesterol. The third group treated by taurine (0.7mg/day/rat) in drinking water and fourth group treated by simvastatin (0.05 mg/day/rat) in drinking water during animal fed on cholesterol in standard ration for 4 weeks. The fifth and six group animals fed standard ration and cholesterol for 4 weeks and treated with taurine and simvastatin (0.7 mg and 0.05 mg /day/rat) in drinking water for 4 weeks respectively. Collected bloodsample and send it to the centrifuge (10000 rpm for 30 minute) to extract serum of blood for parameters of the study (lipid profile and AST and ALT parameters). The results of the present study were examined by (ANOVA) test by using computerized SPSS (Statistical Packages for the Social Sciences) V.18 program. P<0.05 was considered to be the limit of significance. The data were interpreted as mean  $\pm$  standard deviation (mean $\pm$ SD).Least significant difference test (LSD) was used to test the difference between groups (SPSS, 2016).

## **RESULTS AND DISCUSSION**

The effect of taurine supplementation and simvastatin drug on serum lipid profile are presented in table(1).taurine supplementation with high cholesterol diet significantly decreased TC,TG, LDL-C, and VLDL-C concentration and significantly ( $P \le 0.05$ ) increased HDL-C compared with animal fed a high cholesterol diet .Although there was no significant in TC values among the treatment groups, but animal that fed on high cholesterol diet and supplemented with taurine showed significant difference (increasing) in HDL-C and LDL-C concentration when compared with animals treated by simvastatin drug whether the treatment mixed with cholesterol feed or added after induced hypercholesterolemia because of effect of taurine on the influence of enzyme that named 3-hydroxy-3 methylglotryl-CoA reductase (HMG-CoA reductase)(2,6 and 9), function of this enzyme is responsible on the synthesis of cholesterol in the liver ,while function of taurine is to detraction of that enzyme (HMG-CoA reductase) and stop of production and synthesis of cholesterol , there is another role for taurine in the regular of LDL-C, this enzyme called acyltransferase(ACAT) means that if this enzyme is decreased there is no LDL-C out from the cell to the plasma (12,14 and 15),while simvastatin effecting based on enzyme that named 3-hydroxy-3 methylglotryl-CoA reductase (HMG-CoA reductase).

The effect of taurine and simvastatin drug on AST and ALT of hypercholesterolemic rat during four weeks of treatment .the enzymes activities of AST and ALT were significantly ( $P \le 0.05$ )elevated in the serum of rats fed group on high cholesterol ration(CHT) in relation to all of the treatment groups. Whereas taurine treated groups appeared significantly decrease AST and ALT values when compared with animal treated by simvastatin drug through cholesterol feeding and after induced hypercholesterolemia and those AST and ALT values of taurine treated groups resemble to control values.AST and ALT are represent the liver enzymes in the assessment of liver function (18), damage of the liver in cholesterol group causing the release of the AST and ALT (13, 22 and 27). The elevation of Aspartate transaminase (AST) and alanine transaminase (ALT) may cause hepatitis this is observed in cholesterol fed rats in standard ration and this agreed with (12).Taurine treated groups significantly causing stability of AST and ALT activities when compared with control and cholesterol groups and especially with simvastatin treated groups and this is agreed with (11 and 20).

there is significant elevation of Aspartate transaminase (AST) and alanine transaminase (ALT) in cholesterol fed rats with simvastatin when compared with taurine treated groups, this elevation may be caused damage of the liver or occurrence of liver disorder, damage of the liver in cholesterol group causing the release of the AST and ALT (13 and 8).

Parameter	TC	HDL –C	TG	LDL –C	VLDL
	mg/dl	mg/dl	mg/dl	mg/dl	mg/dl
Groups					
Control	83.33	39.84	63.93	30.71	12.78
	±15.13	$\pm 6.45$	±3.44	±13.79	±0.68
	b	bc	cd	С	b
CHT	155.20	11.71	81.41	127.21	16.28
	±17.86	±3.92	±7.59	±17.56	±1.52
	a	e	а	а	а
CHTau.T	82.29	43.74	68.84	28.075	13.76
	±7.30	±8.72	$\pm 6.87$	$\pm 6.80$	±1.37
	b	ab	bc	с	ab
CH+Tau.T	86.00	47.60	60.10	7.10	12.01
	±2.42	±5.49	±3.97	$\pm 1.30$	±0.79
	с	а	d	d	b
CH sim.T	92.34	32.76	74.54	54.35	12.89
	±6.71	±5.79	±4.54	±7.79	±6.48
	b	cd	ab	b	ab
CH+sim.T	94.37	27.34	71.03	24.20	14.20
	±14.03	±5.47	±7.37	$\pm 3.95$	±1.47
	b	d	b	с	ab
LSD	1.04	3.90	2.18	2.63	1.75

# Table (1) Effect of taurine and simvastatin on serum lipid profile in laboratory rats (Mean

±SD)

Different letters means a significant difference at (P≤0.05) level.

Table (2) Effect of taurine and simvastatin on serum Aspartate aminotransferase (AST),Alanine aminotransferase (ALT) activities in laboratory rats (Mean ± SD).

Parameter Group	AST (GOT)u/L	ALT(GPT)u/L	
Control	66.83	40.02	
	±7.17	±6.25	
	b	bc	
CHT	69.96	59.44	
	$\pm 6.63$	±4.54	
	b	а	
CHTau.T	65.30	40.68	
	$\pm 2.59$	±2.11	
	b	bc	
CH+Tau.T	67.33	38.01	
	$\pm 5.85$	$\pm 4.47$	
	b	с	
CH sim.T	78.65	56.05	
	±5.29	$\pm 3.99$	
	а	а	
CH+sim.T	80.51	43.19	
	$\pm 3.94$	$\pm 3.93$	
	а	b	
LSD	1.53	2.00	

Different letters means a significant difference at (P≤0.05) level.

دراسة مقارنة التأثير الخافض للكولسترول للتاورين والسمفاستاتين في ذكور الجرذان المختبرية نمير عبد الكريم الزبيدي مرتضى صالح حاتم فرع الفسلجة والادوية والكيمياء ،كلية الطب البيطري ، البصرة

الخلاصة

أجريت هذه الدراسة لمعرفة تأثير التاورين كعامل خافض للكولسترول ومقارنته مع نتائج عقار سيمفاستاتين على ذكور الجرذان المختبرية. استعمل 36 من ذكور الجرذان المختبرية تتراوح اوزانها بين 170 -200 جم مقسمة إلى ستم جاميع (ستة لكل مجموعة)،تم تغذية مجموعة السيطرةعلى عليقة متوازنة بدون اي اضافة لأربعة أسابيع بينما تم اضافة الكولسترول (10 غم للكيلو غرام/عليقة) الى مجموعة السيطرةعلى عليقة متوازنة بدون اي اضافة لأربعة أسابيع بينما تم اضافة الكولسترول (10 أمل مجموعة)،تم تغذية مجموعة السيطرةعلى عليقة متوازنة بدون اي اضافة لأربعة أسابيع بينما تم اضافة الكولسترول (10 غم للكيلو غرام/عليقة) الى مجموعة الكوليسترول بالعليقة المتوازنة. المجموعة الثالثة والرابعة تم اضافة التاورين والسمفاستاتين(7.0 ملغم و 20.0 ملغم للكيلو غرام /جرذ) الى ماء الشرب مع العليقة المتوازنة المحمونة المتوازنة المحمونة لها الكولسترول لمدة أسابيع . تم تغذية المجموعة الكوليسترول بالعليقة المتوازنة. مع العليقة المتوازنة مع العليقة المتوازنة مع العليقة المتوازنة مع العليقة المتوازنة مع المحموعة الكوليسترول لمدة أسابيع . تم تغذية المجموعة الكوليسترول بالعليقة المتوازنة. مع العليقة المتوازنة المحموعة الثالثة والرابعة تم اضافة التاورين أسماسيع . تم تغذية المجموعة الكوليسترول ما حرذ) الى ماء الشرب مع العليقة المتوازنة المحمافة لها الكولسترول لمدة أسابيع . تم تغذية المجموعة الخامسة والسادسة على العليقة المتوازنة مع الكوليسترول لمدة 4 أسابيع. مرابيع، تم تغذية المجموعة الخامسة والسادسة على العليقة المتوازنة مع الكوليسترول مدة 4 أسابيع. أسابيع . تم تغذية المجموعة الخامسة والسادسة على العليقة المتوازنة مع الكوليسترول لمدة 4 أسابيع.

في نهاية الدر اسة،تمت التضحية بالجرذان وجمع مصل الدم وقياس مستوى الدهون الذي يتضمن (-TC,TG,HDL-C,LDL) وC,LDL و ALT و CLDL). C and VLDL-C)وكذلك تم قياس وظيفة الكبد ( AST و ALT ).

أظهرت النتائج انه كان هناك انخفاض في معايير مستوى الدهون(TC,TG,LDL-C and VLDL-C)و ارتفاع واضح في معيار HDL-Cمع مجموعة التورين والسيمفاستاتين بالمقارنة مع مجموعة السيطرة ومجموعة الكوليسترول. أظهر التاورين أفضل تأثير على الأنشطة لإنزيمية للكبد ومستوى الدهون بالمقارنة مع مجموعة السيمفاستاتين.

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