

Evaluation of Lipids Profile in Hyperlipidemic Mice Treated with some Herbs Plants and Compares their Action with Atorvastatin

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Abstract

Hyperlipidemic is a medical condition with an accumulation in the blood of any or all of the lipid profiles and/or lipoproteins, hyperlipidemic consider as the most reason of coronary heart disease, stroke, high blood pressure and diabetes type 2. The widely use of plant derived component have great attention in the last years because the medicinal plants now used for different disease because it has active compounds such as glycosides, alkaloids and resins. However, there is a limit and contraindicated data about their action on decreasing the level of lipoproteins in the serum. In this study three different resins of different medicinal plant were used to evaluate cholesterol, TG, LDL, HDL and VLDL. Results of this study revealed that Aloe Vera resin extract has a major effect on LDL-C ($p > 0.05$) similar to the action of atorvastatin, Boswell results showed an inconsiderable effect compared to the effect of Atorvastatin drug. Commiphora results showing that the anti-hyperlipidemic effect of Commiphora Mol resin was noticeable and has the same effect of atorvastatin on triglycerides ($p > 0.05$) finally the combination effect only on total cholesterol and on HDL-C, ($p > 0.05$) when compared to atorvastatin. Conclusions: These different derived plants are varied in their action on lowering lipoprotein levels of induced hyperlipidemic effect when compared with atorvastatin the anti-hyperlipidemic standard drug which effect on all lipids profile.

Keywords: Hyperlipidemic; Aloevera; Boswell sacra; Commiphora Molmol; Atorvastatin

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Introduction

Recently plant derived component have great attention because of its low cost and low side effects, In the world the medicinal plant now used for treatment different diseases because it has active compounds such as glycosides, alkaloids and resins, such as Obesity and hyperlipidemic which consider as the most reason of coronary heart disease, stroke, high blood pressure and diabetes type 2 [1]. Aloe Vera: For many years, Aloe Vera has been used for its healing and medicinal properties as perennial succulent xerophytes that grow water storage tissue in the leaves to thrive in dry areas with low or intermittent rainfall [2]. Moreover, the active pharmacological ingredients are concentrated in both the Aloe Vera leaves gel and rind. Aloe Vera is popularly known by taxonomists as Aloe barbadensis [3].

Boswellia Sacra

The Boswellia genus has historically been used in the treatment of different diseases such as diabetes [4]. Gum resin is commonly used in India as a medicinal plant to treat various diseases, including inflammatory disease, arthritis, heart disease and pain [5]. Several studies have shown that boswellic acids are the main components of

Olibanum gum resin and have anti-inflammatory, anti-cancer and anti-ulcer effect [6,7]. Plants belonging to the Boswellia group were used locally to treat hyperlipidemic. The leaves, bark, and roots extract of Boswellia serrate, cartarri, and papirifera was explicitly administered to patients with hyperlipidemic [8]. However, the extract from B. Sacra species are yet to be investigated for antihyperlipidemic activities, although they contain a number of photochemical that may be of therapeutic benefit [9]. Commiphora Molmol (Myrrh) is one of the thorny small tree species that belong to the aromatic resin of the genes Commiphora [10], which is an basic oil, named an oleoresin, Myrrh resin is a gum in nature and it has been utilized all through history as a perfume, incense and pharmaceutical. It can moreover be ingested by blending it with wine [11]. It is one of the foremost prepared known arrangements which have been wide utilized by ancient Egyptians and it was one of the three gifts acknowledged to have been promoted to the infant child Jesus by Magi [12]. In addition to that it is an oleo-gum-resin gotten from the stem of diverse species of Commiphora. It could be a ruddy brown mass, covered with a brownish yellow dust. It incorporates a bitter taste and a balsamic odor; with water it forms an emulsion [13,14]. According to the data given by the National Competent Specialists Austria: Myrrh is found in combination



products (as ethanol extracts) used as bitters for stomach problems, Czech Republic: There are no single active ingredient products, but several combination products (Schwedenbitter) containing myrrh are available that are used as adjuvant in mild gastrointestinal complaints (since 1980) containing myrrh tincture, either alone or in product combinations, using it as local astringent and anesthetic in the mouth. United Kingdom: Myrrh tincture (British Pharmaceutical Codex) comes as a drug that was first approved in 1972 [15].

Atorvastatin

Statins are structural analogs of 3-hydroxy-3-methyl glutaryl-coenzyme A and inhibit competitively the enzyme HMG-CoA reductase, which is responsible for the first step in sterol biosynthesis [16]. It is used in the treatment of hyperlipidemic and it works at the same pattern to the pathway of Bisphosphonates, as for statin's ability to inhibit HMG-CoA reductase, a central enzyme in cholesterol synthesis pathways [17].

Materials and Methods

Animals

In this study 18 male mice used, which were housed in wire bottom cages, free standard diet, tap water and with a 12 h light/dark cycle for 3 weeks (the experimental period). The animals were randomly divided into 6 groups, each experimental group considered 3 animals. All animal groups were fed with standard diet with butter for 2 weeks then we stopped butter before starting treatment.

- **Placebo group**

They were fed with only standard diet and butter for 2 weeks.

- **Aloe group**

Animals were treated with a solution of extract of Aloe (1 ml) a day for 1 week.

- **Boswellia group**

Animals were treated with a solution of extract of Boswellia (1 ml) a day for 1 week.

- **Commiphora group**

Animals were treated with a solution of extract of Commiphora (1 ml) a day for one week.

- **Combination group (aloe, Boswellia, and Commiphora)**

Animals were treated with a combination of extract of (Aloe, Boswellia, and Commiphora) (0.5 ml) a day for one week.

- **Atorvastatin group**

Animals were treated with a solution of the chemical drug (0.1 ml) a day for one week.

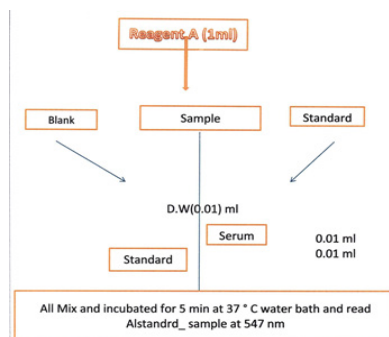
Cholesterol, TG, HDL, and LDL determination

TG: It was estimated according to the manner in enzymatic way [18] where TG in turn in the serum through a series of chemical reactions and the presence of a number of enzymes to Keaton pink color Materials were used as follows:

- To prepare Reagent the composition includes: Goods buffer (10) mol/L; Magnesium chloride (15) mmol/L; ATP (4) mmol/L; 4 AAP mmol /L; Toos (0.1) mmol/L; LPL (2500) U/L; GPO (5500) U/L; POD (1800) U/L

- To prepare Standard the composition of Glycerol is (2.28) mmol/L.

- The mode of action is as follows



$$T.G \text{ mg/dl} = (E) \text{ Sample} / (E) \text{ Standard} \times 200$$

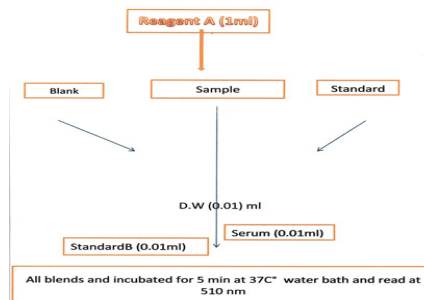
Dividing T.G. to extract 5 VLDL

Specifies the level of cholesterol: It was estimated cholesterol manner in enzymatic according to Allain C, et al. (1974) [19]. If this method depends on the conversion of cholesterol esters presence of oxygen and enzyme oxidase cholesterol, which works on the oxidation of cholesterol free formed Halftime interaction to (cholesterol 4en-3one) and (hydrogen peroxide) and reacts the latter with phenol and 4-aminoantipyrine) the presence of peroxidase enzyme to be Keaton Amin quinoneoimine pink color.

- To prepare Reagent the composition includes- Good buffer (100) U/L; Cholesterol esterase (300) U/L; Cholesterol oxidase (300) U/L; Peroxide (1500) U/L; 4_AAP (1) mmol/L; Phenol derivatives (5) mmol/L

- To prepare Standard the composition of Cholesterol is (200) mg/dl.

- The mode of action is as follows



$$CHOL.mg/dl = (E) \text{ Sample} / (E) \text{ Standard} \times 200$$

Measurement of high density lipoproteins (HDL): Proteins were estimated high density manner in accordance with the enzymatic method [20]. This method relies on the deposition minutes emulsifying Kilos and LDL and VLDL in the blood serum is done by adding the deposition factor (recipitiating-A) to serum samples and after the completion of this process the samples and placed in a centrifuge, note that the resulting solution after precipitation is serene and turns to HOL, which can measure the level of cholesterol in it using a Reagent A of the kit for assessing the level of cholesterol.

Measurement of low density lipoproteins (LDL): When you extract the amount of high density lipoproteins in addition to



Table 1: Materials and devices used in the study

Plants (A. Vera resin, a.Serrata resin , C.Molmol, resine)	Local market
Balance	Made in china
Filter paper	Made in china
Syringe	Made in Spain
Glass rod	Made in Germany
Beakers	Made in Germany
Conical flask	Made in Germany
Grinding machine	Made in Germany
Gloves	Made in China
D.W	Made in Iraq
90% ethanol	Made in Iraq
Petri dish	Made in china
Blood collection tubes	Made in china
Soxhlet apparatus	Made in Germany

cholesterol and lipoproteins and very low density extracted from TG/5 extract humiliation of the following formula:

- $LDL = TG - (HDL - 5 + VLDL - 5)$ (Assmann, 1983)

Statistical Analysis

A one-way analysis of variance was performed to test whether group variance was significant or not, the comparison between groups were used analysis of variance test (ANOVA).

- P-value <0.05 was considered significant difference.
- P-value >0.05 was considered no significant difference.

Results

This table showing that the most effect of Aleo Vera was in the LDL-C which consider main factor for causing coronary heart diseases (Table 2).

This table showing that the antihyperlipidemic effect of Boswellia Sacra resin was inconsiderable compared to the effect of Atorvastatin drug (Table 3).

This table showing that the antihyperlipidemic effect of Commiphora Molmol resin was noticeable and has the same effect of atorvastatin on triglycerides (Table 4).

Table 2: Comparison between the antihyperlipidemic effect of Aloe Vera and atorvastatin.

Parameter	Placebo	Atorvastatin	Aleo Vera	P-Value
Total Cholesterol	126.67±22	68.66±2.8	81.17±0.7	0.007**
Triglycerides	145.33±4.13	61±1.68	107±1.95	0.006**
LDL-C	151.3.22	45.66±4.41	26.33±5.16	0.420
VHDL-C	29.33±1.36	13±3.8	33±4.47	0.001**
HDL-C	23.66±5.7	12±3.57	20.66±2.8	0.769

Where: (**): Highly significance (p<0.01)

Table 3: Comparison between the antihyperlipidemic effect of Boswellia Sacra resin and atorvastatin.

Parameter	Placebo	Atorvastatin	Boswellia Sacra	P-Value
Total Cholesterol	126.67±22	68.66±2.8	86.33±8.59	0.02*
Triglycerides	145.33±4.13	61±1.68	108.6±4.4	0.001**
LDL-C	151.3.22	45.66±4.41	30.33±4.92	0.012*
VLDL-C	29.33±1.36	13±3.8	22.47±1.93	0.004**
HDL-C	23.66±5.7	12±3.57	36.66±6.77	0.001**

Where: (**): Highly significance (p<0.01); (*): significance (p<0.05).

Table 4: Comparison between the antihyperlipidemic effect of Commiphora Molmol and atorvastatin

Parameter	Placebo	Atorvastatin	Commiphora Molmol	P-Value
Total Cholesterol	126.67±22	68.66±2.8	87.66±6.71	0.01*
Triglycerides	145.33±4.13	61±1.68	62.66±13.09	0.795
LDL-C	151.3.22	45.66±4.41	12±4.47	0.01*
VLDL-C	29.33±1.36	13±3.8	12.66±3.61	0.829
HDL-C	23.66±5.7	12±3.57	59.1±12.42	0.001**

Where: (**): Highly significance (p<0.01); (*): significance (p<0.05).

Table 5: Comparison between the antihyperlipidemic effect of Combination (the three resin extract) with atorvastatin.

Parameter	Placebo	Atorvastatin	Combination	P- Value
Total Cholesterol	126.67±22	68.66±2.8	72.66±6.37	0.22
Triglycerides	145.33±4.13	61±1.68	90.33±3.72	0.0001**
LDL-C	151.3.22	45.66±4.41	32.66±5.95	0.016*
VLDL-C	29.33±1.36	13±3.8	18.66±2.55	0.014*
HDL-C	23.66±5.7	18±3.57	21.3±2.54	0.053

Where: (**): Highly significance (p<0.01), (*): significance (p<0.05).

This table showed the effect of combined herbs was only on total cholesterol and on HDL-C, (p>0.05) when compared to atorvastatin (Table 5).

Discussion

Hyperlipidemic could be a restorative condition characterized by a height of any or all lipid profile and/or lipoproteins within the blood. It is additionally called hypercholesterolemia / hyperlipoproteinemia [21]. This study revealed comparison between the atorvastatin (standard drug for treatment hyperlipidemic) effect and some herbal resin extract on high fat diet induced hyperlipidemic mouse, according to the table 2 which include the comparison between atorvastatin and Aloe Vera resin extract it was found that the herbal resin extract improved the lipid profile but atorvastatin was the better specially in total cholesterol, triglycerides and VLDL-C p-values was highly significant (p<0.01), this results agreed with other results done to investigate the role of anti hyperlipidemic effect of Aloe Vera extract on high fat diet mouse. Semalty, 2016 furthermore the Aloe Vera resin astract showed non-significant differences with atorvastatin in lowering the LDL-C which consider the trigger for coronary heart diseases [22] and HDL-C, that mean it has the same effect on these lipoprotein. Regarding to the table 3 which include the comparison between the standard drug atorvastatin and Boswellia resin extract, although there was a reduction in lipids profile in Boswellia resin astract group but it was found that there were significant differences (p<0.05) in improving the total cholesterol and the LDL-C while there were highly significant differences (p<0.01) in lowering triglycerides, HDL-C and VLDL-C that means atorvastatin more better than Boswellia resin extract in improving the hyperlipidemic mouse. Thus, use of Boswellia resin extract failed to demonstrate significantly better effect on lipid profile in high fat diet mouse compared with the atorvastatin group. This study was similar to other recent study done by Mehrzadi S (2018) on diabetic patients with hyperlipidemic in this study there was a considerable reduction after the intervention of Boswellia resin group, no significant difference was observed in all outcome measures between the intervention group and placebo groups at the end of the study [23]. In table 4 the experiment have been shown non-significant differences (p>0.05) between Commiphora Molmol resin extract and atorvastatin drug on triglycerides and VLDL-C this means that this herbal extract could be used in management of triglyceride in serum these result was agreed with other study done on induced type-2 diabetes in rats, which is



associated with the hypertriglyceridemia, insulin resistance, and other complications of diabetes [24]. Other study agreed with these results aimed to evaluate the anti-hyperlipidemic activities of Commiphora Molmol extract and its effects on body weight and blood lipids which concluded the effect of Commiphora Molmol extract appeared to be more effective on TG than on TC [25] and this was exactly identical with these results that showed there were significant differences ($p < 0.05$) between Commiphora resin extract and atorvastatin on total cholesterol, LDL-C and HDL-C which mean that extract has little effect on the above parameter compared to triglycerides [26-28]. According to table 5, the study proved that the effect of combined herbs was only on total cholesterol, ($p > 0.05$) when compared to atorvastatin this mean it's a good formula for lowering the total cholesterol but this need more repeated experiments on lab animal because the effect on other parameter of lipids profile were contracted and not noticeable statistically ($p < 0.05$).

Conclusion

The results denote that Aloe Vera resin extract has a major effect on LDL-C but not observative effect on other parameter of lipids profile, Boswellia resin extract group showed anti hyperlipidemic effect but it was statically non- significant, Commiphora (myrrh) extract showed noticeable effect on triglycerides while the combination effect was only on total cholesterol but contracted with parameter of lipid profile.

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References

- Okhti ZA, Muthanna I, Al-Ezzi AR (2016) The protective role of flaxseed Lignan in male rabbits with high-fat diet: Histopathological study, *Int J Pharm Sci* 8: 90-94.
- Akev N, Can A, Sütülpınar N, Çandöken E, Özsoy N, et al. (2015) Twenty years of research on Aloe Vera, *İstanbul Üniversitesi Eczacılık Fakültesi Dergisi* 45: 191-215.
- Nandal U, Bhardwaj RL (2012) Aloe Vera for human nutrition, health and cosmetic use-A review. *Int J Plant Sci* 3: 038-046
- Azadmehr A, Ziaee A, Ghanei L, Huseini HF, Hajiaghaee R, et al. (2014) A randomized clinical trial study: anti-oxidant, anti-hyperglycemic and anti-hyperlipidemic effects of olibanum gum in type 2 diabetic patients. *Iranian journal of pharmaceutical research. Iran J Pharm Res* 13: 1003.
- Shojaii A, Goushegir A, Dabaghian FH, Abdollahi M, Huseini HF (2011) Herbs and herbal preparations for glycemic control in diabetes mellitus (a systematic review), *J Med Plants Res* 5: 3846-3855.
- Upaganlawar A, Ghule B (2009) Pharmacological activities of *Boswellia serrata* Roxb-mini review *Ethno Botanical Leaflets* 13: 766-774.
- Shen T, Lou HX (2008) Bioactive constituents of myrrh and frankincense, two simultaneously prescribed gum resins in Chinese traditional medicine. *Chem Biodivers* 5: 540-553.
- Jaafaru MS, Kyomson ID, Waziri PM, Yakubu Y, Mustapha MB, et al. (2017) In vivo ameliorative effect of metabolic extract of *Boswellia dalzielii* Hutch (Mebdh) stem bark on Triton X-100 induced hyperlipidemic. *Sci World J* 12: 34-37.
- Qurishi Y, Hamid A, Zargar MA, Singh SK, Saxena AK (2010) Potential role of natural molecules in health and disease: Importance of boswellic acid. *J Med Plants Res* 4: 2778-2785.
- Bongoni R, Steenbekkers LP, Verkerk R, Van Boekel MA, Dekker M (2013) Studying consumer behaviour related to the quality of food: A case on vegetable preparation affecting sensory and health attributes. *Trends Food Sci Technol* 33: 139-145.
- Fabricant DS, Farnsworth NR (2001) The value of plants used in traditional medicine for drug discovery. *Environ Health Perspect* 109: 69-75.
- El Ashry ES, Rashed N, Salama OM, Saleh A (2003) Components, therapeutic value and uses of myrrh. *Pharmazie* 58: 163-168.
- Wallis TE (2005) Text book of Pharmacognosy. (5th edtn), India.
- Trease GE, Evans WC (1989) Pharmacognosy A. physician's guide to herbal medicine. Textbook of Pharmacognosy. (13th edtn), Bailliere Tindal Publishers, United Kingdom.
- Maver T, Maver U, Pivec T, Kurečić M, Persin Z, et al. (2018) Active substances for acceleration of wound healing. In *Bioactive polysaccharide materials for modern wound healing*, Springer, Switzerland.
- El-Nabarawi N, El-Wakd M, Salem M (2017) Atorvastatin, a double weapon in osteoporosis treatment: an experimental and clinical study. *Drug Des Devel Ther* 11: 1383-1391.
- Werner N, Nickenig G, Laufs U (2002) Pleiotropic effects of HMG-CoA reductase inhibitors. *Basic Res Cardiol* 97: 105-116.
- Fassati P, Prencipe L (1982) Serum triglycerides determined in colorimetric ally with an enzyme that produce hydrogen peroxide. *Clin Chem* 28: 2077-2080.
- Allain CC, Poon LS, Chan CS, Richmond WF, Fu PC (1974) Enzymatic determination of total serum cholesterol. *Clin Chem* 20: 470-475.
- Burstein S, Zamosciany H, Kimball HL, Chaudhuri NK, Gut M (1970) Transformation of labeled cholesterol, 20 α -hydroxycholesterol, (22R)-22-hydroxycholesterol, and (22R)-20 α , 22-dihydroxycholesterol by adrenal acetone-dried preparations from guinea pigs, cattle and man: I. Establishment of radiochemical purity of products. *Steroids* 15: 13-60.
- Onwe PE, Folawiyo MA, Anyigor-Ogah CS, Umahi G, Okorochoa AE, et al. (2015) Hyperlipidemic: etiology and possible control. *IOSR-JDMS* 14: 93-100.
- Laufs U, Karmann B, Pittrow D (2016) Atorvastatin treatment and LDL cholesterol target attainment in patients at very high cardiovascular risk. *Clin Res Cardiol* 105: 783-790.
- Mehrzadi S, Tavakolifar B, Huseini HF, Mosavat SH, Heydari M (2018) The effects of *Boswellia serrata* gum resin on the blood glucose and lipid profile of diabetic patients: A double-blind randomized placebo-controlled clinical trial. *J Evid Based Integr Med* 23.
- Ramesh B, Saralakumari D (2012) Antihyperglycemic, hyperlipidemic and antioxidant activities of ethanolic extract of *Commiphora mukul* gum resin in fructose-fed male Wistar rats. *J Physiol Biochem* 68: 573-582.
- Shalaby MA, Hammouda AA (2014) Analgesic, anti-inflammatory and anti-hyperlipidemic activities of *Commiphora molmol* extract (Myrrh). *J Intercult Ethnopharmacol* 3: 56-62.
- Assmann G, Fredrickson DS (1983) Acid lipase deficiency: Wolman disease and cholesteryl ester storage disease, the Metabolic basis of inherited diseases, Mac Graw Hill, New York.
- Semalty M, Kumar R, Semalty A (2016) Formulation and characterization of herbal formulation for antihyperlipidemic activity in diet induced obese mice. *Indian Drugs* 53.
- Torres-Piedra M, Ortiz-Andrade R, Villalobos-Molina R, Singh N, Medina-Franco JL, et al. (2010) A comparative study of flavonoid analogues on streptozotocin-nicotinamide induced diabetic rats: Quercetin as a potential antidiabetic agent acting via 11 β -hydroxysteroid dehydrogenase type 1 inhibition. *Eur J Med Chem* 45: 2606-2612.