

## Evaluation of hypolipidemic effect of ethanolic leaf extract of *Aegle marmelos* in hyperlipidemic rat models

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**Abstract:** Elevated serum cholesterol levels leading to atherosclerosis can cause coronary heart disease (CHD). Hyperlipidemia is a major risk factor for the development of coronary heart disease and is the most common cause of mortality and morbidity worldwide. Currently available synthetic drug of hyperlipidemia are associated with a number of side effects. In recent times, a large volume of work aimed at the efficacy of herbal products, as they are safe and effective alternatives to synthetic drugs. The hypolipidemic activity of *Aegle marmelos* leaves extract was studied on high fat diet induced hyperlipidemic models of wistar rats at a dose of 125 and 250mg/kg. Hyperlipidemia in experimental rats is evidenced by with ethanolic elevated serum cholesterol, TG, LDL and decreased HDL levels. Treatment with extract significantly decreased serum cholesterol, triglycerides, low density lipoprotein and significantly increased the high density lipoprotein in hyperlipidemic rats. The findings of the study reveals that ethanolic extract of *Aegle marmelos* leaves can effectively control the blood serum lipid profile

**Keyword-** *Aegle marmelos*, atherosclerosis, coronary heart disease, Hyperlipidemia, triglycerides

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### I. Introduction

Cardiovascular diseases (CVD) /Coronary artery diseases (CAD) are the major cause of morbidity & mortality throughout the world especially in developed countries. It accounts for more than 17.3million deaths per year a number that is expected to grow to more than 23.6 million by 2030. [1]Hyperlipidemia associated lipid disorders are considered to cause the atherosclerotic cardiovascular disease. It is ranked as one of the greatest risk factors contributing to prevalence and severity of coronary heart diseases and is characterized by elevated serum total cholesterol, low density lipoprotein (LDL), very low density lipoprotein (VLDL) and decrease high density lipoprotein (HDL). The known hypolipidemic drugs, such as statins and fibrates have many side effects like hyperuricemia, diarrhea, nausea, gastric irritation, flushing, dry skin and also that they are not suitable for use during pregnancy, have made scientists look towards hypolipidemic agents of plant origin[2,3]. In recent years the botanicals are gaining momentum for treatment of various diseases, as they claimed to have minimum/ no adverse effect, easily available at desirable price and sometime the only source of health care available to the poor. In recent times, however, a large volume of work aimed at the efficacy of herbal remedies, as they are safe and effective alternatives to modern medicine. Medicinal plants are widely used by majority of populations to cure various disease and illness and have impact on the world's economy. Out of a large number of herbal drugs stated to possess hypolipidemic activity in the Ayurvedic system *A.marmelos* are among these herbal plants due to their cardio protective and hypolipidemic properties [4]. *Aegle marmelos* commonly known as Bael belonging to the family Rutaceae is an aromatic tree indigenous to India which has enormous traditional uses against various diseases.[5]It is deciduous, glabrous, armed tree with trifoliate leaves, short flower and globular fruits. The plant is of very high value in treating cardiac disorders, dysentery, diarrhea, diabetes, fever, inflammation, and pain.[6]The plant has shown various activities including anticancer, hypoglycemic, anti-inflammatory, antihyperlipidemic, analgesic and antiviral properties.[7,8]*A.marmelos* leaf extract was demonstrated to reduce serum cholesterol in alloxan diabetic rats and posses antihyperlipidemic effect in rats[9].In the present study ,an attempt has been made to evaluate the hypolipidemic activity of *Amarmelos* leaf extract in high cholesterol diet induced hyperlipidemia wistar rats.

## II. Materials and methods.

### 2.1 Experimental animals

Male wistar rats weighing 150-200gm were used in present study. Four groups of six rats were housed in polypropylene cages under standard laboratory conditions. They were given standard rat pellets, tap water and high cholesterol diet according to their group.

### 2.2 Preparation of plant extract

*A. marmelos* leaves were collected from local area of Patna, Bihar and were dried, grinded and powder was used for extraction. The leaves powder were kept in percolator with 95% ethanol for 24 hrs. The residue was removed by filtration and the ethanolic extracts were concentrated on rotary evaporator to get the solid yield [10,11].

### 2.3 High fat diet (HFD) induced hyperlipidemic study

Hyperlipidemia was induced in male wistar rats by feeding them with a high fat diet for 4 weeks. High fat diet elevated the serum cholesterol levels when compared to normal levels and reduced the HDL-C levels significantly. [12] To confirm the induction of hyperlipidemia, blood samples were collected and lipid profile was determined using diagnostics kits.

Table

| Ingredients  | Quantity(g/100g) |
|--------------|------------------|
| Cornflour    | 25               |
| Sucrose      | 15               |
| Casein       | 5                |
| Egg yolk     | 3                |
| Lard         | 1                |
| Salt mixture | 1                |
| Cholesterol  | 1                |

### 2.4 Dose Preparation and Administration of Extracts.

The extracts of plants were dissolved in distilled water and a dose of 12mg/kg b wt and 20mg/kg b wt were given to animals once in day along with HFD orally for 30 days.

### 2.5 Experimental Design.

Group I: Normal

Group II: High Fat Diet Control

Group III: Hyperlipidemic rats treated with *Aegle marmelos* [125mg/kg bwt]

Group IV: Hyperlipidemic rats treated with *Aegle marmelos* [250mg/kg bwt]

## III. Result

Feeding animals with high fat diet produces a significant elevation in serum cholesterol level, as well as increase in triglycerides and LDL levels with decrease in level of good cholesterol HDL when compared to that of normal rats. Table 1 shows the effect of oral administration of ethanolic extracts of *Aegle marmelos* leaves on hyperlipidemic rats for 30 days. Effect of treatment with *A. marmelos* leaves extract (Group III) at a dose of 125mg/kg and (Group IV) at a dose of 250mg/kg significantly reduced the elevated serum cholesterol and triglycerides when compared to the HFD treated group (Group II). The treatment of hyperlipidemic rats with extract of *A. marmelos* leaves at dose of 125mg/kg (Group III) shows a slight action in lowering cholesterol, triglycerides and LDL with increased level of HDL when compared with the (Group IV). Administration of *A. marmelos* leaves extract at dose of 250mg/kg have shown slightly better significant changes in all biochemical parameters when compared to Group III values. It has been reported that the leaf of *Aegle marmelos* possesses hypolipidemic efficacy. [13]. Fresh alcoholic leaf extracts of *Aegle marmelos* were reported to have a cardio tonic effects in mammals. The levels of serum total cholesterol, triglycerides, LDL were significantly reduced in the plant extracts treated hyperlipidemic animals [14,15].

## IV. Discussion

Hyperlipidemia indicates the onset of abnormalities in lipid metabolism secondary to manifestation and progression of atherosclerosis. The investigation of lipid lowering activity on herbs will be useful strategy in the discovery of new molecules eliciting improved activity by regulating through different mechanism of action. As the pharmacologists are looking forward to develop new drugs from natural sources, development of modern drugs from *A. marmelos* can be emphasized for the control of various diseases. It can be concluded from above study that ethanolic extracts of *Aegle marmelos* can effectively control the blood lipid levels in dyslipidemic

conditions. Further studies are needed to elucidate the exact phytoconstituent and mechanism underlying the regulation of serum lipid levels.

### References

- [1]. Niharika verma, Int J Curr Pharm res, vol9, 6-14, Introduction to hyperlipidemia and its treatment.
- [2]. Narender T, Shweta S, Tiwari P, Papi Reddy K, Khaliq T, Antihyperglycemic and antidyslipidemic agent from *Aegle marmelos*. Bioorganic & Medicinal Chemistry Letters 2007; 17:1808–181.
- [3]. Kamalakkannan N, Prince PS, Antihyperlipidaemic effect of *Aegle marmelos* fruit extract in Streptozotocin-induced diabetes in rats. J. Sci. Food Agric 2005; 85: 569
- [4]. Gupta A, Kand Tondon N, Review on Indian medicinal plants, Indian council of medicinal research, New Delhi, (2004) 312
- [5]. Maity P, Hansda D., Bandyopadhyay U. & Mishra D.K “Biological activities of crude extracts of chemical constituents of *Bael*, *Aegle marmelos* (L.) Corr.” Indian Journal of Experimental Biology, (2009) Vol 47, 849-861.
- [6]. Saswati Parichha. “*Bael* (*Aegle Marmelos*): Nature's Most Natural Medicinal Fruit”, Orissa Review 2004.
- [7]. Upadhyaya S, Shanbhag KK, Suneetha G, Balachandra Naidu M, Upadhyaya S.A study of hypoglycemic and antioxidant activity of *Aegle marmelos* in alloxan induced diabetic rats. Indian Journal of Physiology & Pharmacology 2004; 48 (4): 476–80.
- [8]. Dhuley JN, Investigation on the gastroprotective and antidiarrhoeal properties of *Aegle marmelos* unripe fruit extracts. Hindustan Antibiotics Bulletin 2007; 41: 45-46
- [9]. Ponnachan PTC, Paulose C Set al, Effect of leaf extract of *Aegle marmelos* in diabetic rats, Indian J Exp Biol, 3(1993)345.
- [10]. Rodda Raghuvver et al, 2011. Antihyperlipidemic effect of *T. erecta* in cholesterol fed hyperlipidemic rats. Scholars Research Library, 266-270.
- [11]. Modi Dixit C et al. Antihyperlipidemic activity of *S. cumini* Linn. seed extract on high cholesterol fed diet rats. Int. J. Ph. Sci. 2009, 1(2), 330-332.
- [12]. C. Das, S. Dash et al. Antihyperlipidemic activity of *Adenanthera pavonina* ethanolic bark extract fractions, NPT (2011) 1(2):1-4.
- [13]. Kesari AN, Gupta RK, Singh SK, Diwakar S, Watal G, Hypoglycemic and antihyperglycemic activity of *Aegle marmelos* seed extract in normal and diabetic rats. Journal of Ethnopharmacology 2006; 107(3): 374-79.
- [14]. Kanungo S. K, Panda D. S, Swain S. R, et al. Comparative Evaluation Of Hypolipidemic Activity Of Some Marketed Herbal Formulations In Triton Induced Hyperlipidemic Rats Pharmacologyonline 3: 211-221 (2007).
- [15]. Patel DK, Patel KA, Patel UK, Thounaoja MC, Jadeja RN, Ansarullah, et al. Assessment Of Lipid Lowering Effect Of *Sida rhomboides*. Roxb Methanolic Extract In Experimentally Induced Hyperlipidemia, J Young Pharma. 2009; 1(3):233- 238.

**TABLE 1:** Effect of *Aegle marmelos* leaves extract on various parameters in High Fat Diet rats.

| Parameter             | Normal<br>(Group I) | High Fat Diet<br>Control (HFD)<br>(Group II) | HFD + <i>A. marmelos</i><br>leave extract (125 mg/kg/b.wt/<br>)<br>(Group III) | HFD + <i>A. marmelos</i> leave<br>extract (250 mg/kg/b.wt)<br>(Group IV) |
|-----------------------|---------------------|----------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Cholesterol (mg/dl)   | 77.77 ± 4.05        | 183.33 ± 6.67                                | 103.33 ± 7.13                                                                  | 86.7 ± 3.9                                                               |
| Triglycerides (mg/dl) | 67.7 ± 2.7          | 171.5 ± 3.4                                  | 110.3 ± 2.3                                                                    | 94.33 ± 2.0                                                              |
| HDL (mg/dl)           | 43.9 ± 1.2          | 37.9 ± 1.4                                   | 40.2 ± 2.6                                                                     | 42.9 ± 1.8                                                               |
| LDL (mg/dl)           | 33.3 ± 1.8          | 65.7 ± 9.6                                   | 40.7 ± 2.0                                                                     | 28.62 ± 1.89                                                             |

[Values are in mean ± SD, Number of animals in each group = 6]

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