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# EVALUATION OF ANTI-HYPERLIPIDEMIC EFFECT OF *COMMNIPHORA MUKUL* BARK AND SEEDS POWDERON WISTAR RATS

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## ABSTRACT

The present study was aimed to investigate the anti-hyperlipidaemia activity of *Commniphora mukul* bark and seeds powder on high fat high cholesterol (HFHC) fed rats group. The effect of *Commniphora mukul* bark and seeds powder on serum and tissue lipid profile of albino rats were studied. In addition, body weight changes, organs weight, relative liver size and food consumption were evaluated in the entire existence groups. Results revealed that in both studies *Commniphora mukul* bark and seeds powder showed the reduction in serum and tissue phospholipid, free fatty acid, triglycerides and total cholesterol levels and increases the protein and albumin level in experimental groups as compare to HFHC group. The value of phospholipid, free fatty acid, triglycerides and total cholesterol where increased in HFHC groups whereas the levels decreased by the treatment with bark and seeds powder with simultaneous increase in protein, albumin and serum HDL levels. Hence the results justify that *Commniphora mukul* possess anti-hyperlipidaemia activity.

## KEYWORDS

*Commniphora mukul*, Anti- hyperlipidaemia, Cholesterol, Phospholipid and Triglycerides.

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## INTRODUCTION

The elevated levels of lipids and cholesterol in the blood is referred as hyperlipidemia, it is also known as dyslipidemia, to explain the manifestations of different disorders of lipoprotein metabolism. The continuous improvement of living standard in worldwide, the population of individuals with hyperlipidemic condition has expanded. The clinical signs of this condition are an increase in the level of fasting serum cholesterol (hypercholesterolemia) or the level of fasting serum

triglyceride (hypertriglyceridemia) or sometime both the conditions may occur[1]. It can be controlled by ayurvedic or herbal treatment without any type of side effects. Various medicinal plants, such as arid zone plants, herbal plants and some shrubs have the potential role in the prevention and treatment of human diseases. The arid zones plants are also consider as wild plants as they don't need any type of special care and maintenance. Such plants have some medicinal property thus used in prevention and treatment of various health ailments. Among various arid zone plants, the plant *Commiphora mukul* has the potential role in treating various diseases.

*Commiphora mukul* is a member of Burseraceae family which is found in arid areas of India, Bangladesh, and Pakistan. A small, bushy tree with thorny branches, it produces a yellowish gum resin in small ducts located throughout its bark. In every collecting season the plant *Commiphora mukul* tree yields between 250–500 grams of dry resin, which is extracted from the bark through a process which is called tapping. In tapping process, a notch is made on the bark of the tree. The resin is seeps out from the notch and is allowed to harden before it is collected. The tree is tapped in the months of November to January whereas the resin is collected in the month of May or June.

*Commiphora mukul,* is a complex mixture of steroids, diterpenoids, aliphatic esters, carbohydrates and a variety of inorganic ions, besides the minor amounts of sesamin and other unidentified constituents[2]. Bose and Gupta[3] separated the gum resin into a soluble resin and insoluble carbohydrate gum, by using alcohol extraction. According to Fatope *et al.*[4], *Commiphora mukul* contains more than 150 type of various compounds and some new compounds continue to be reported. Guggulsterones E and Z are believed to be effective for creating hypolipidaemic condition and are also considered as a most important component of *Commiphora mukul* gum resin. Along with these two compounds, some other compounds have been reported from time to time by various workers[2,4-9]. Jain and Gupta[10] observed the presence of various components including essential oils (0.37%) in *Commiphora mukul* gum resin. The gum-resin of *Commiphora mukul* is essentially consists of an ethyl acetate-soluble fraction (45%) along with insoluble carbohydrate gum (55%) in it. The desired biological activity lies entirely in the soluble cut and insoluble fraction is toxic to rats and devoid of any hypolipidaemic activity[11]. The crude gum of *Commiphora mukul* was found to contain about 2% of guggulsterone where as4% - 4.5% guggulsterones was found in ethyl acetate extract. E and Z guggulsterones have been reported to be 10%[12]. According to Ramawat *et al.*[13], the two isomers of guggulsterones i.e E- and Z are interconvertible in callus and cell cultures.

Lipid lowering activity of guggul however, was first reported by Satyavati[3] which was further confirmed in many experimental models[4]. *Commiphora mukul* has been used as an inactive pharmaceutical ingredient, binding agent, anti-obesity agent, and cholesterol reducing agent. The resin secreted by the plant *Commiphora mukul* is one of the widely used drugs for the treatment of various several disorders in Ayurveda such as gout arthritis, rheumatism, atherosclerosis, ulcers and inflammation[5]. Early researches looking at the effect of gugglesterone appeared to have affirmative effects on hyperlipidaemia. Studies, in both animal and humans demonstrated that guggulsterone may significantly lower blood lipid levels[6,7] and may lower cholesterol levels[8,9].

## METHODOLOGY

### Collection of Plant material

The bark and seeds powder of *Commniphora mukul* were collected from the herbal powder agency, from jaipur, Rajasthan.

### Maintenance of Animals

42 male wistar strain albino rats 3-4 weeks old and weighing 75-100 g were procured from Chaudhary Charan Singh Haryana Agricultural University, Hissar India. Animal care and handling was conducted confirming to the ethical guidelines of CPCSEA (Committee for the purpose of control

and supervision on experiments on animals) for animal upkeep in laboratory experiments. The study protocol was approved by Institutional Animal Ethics committee (IAEC) of the university.

**Experimental Design**

In the pre experimental period the animals were given free access to standard basal diet, water, spinach, sprouted gram and daliya. After the initial adaptation period the animals were divided into four groups of six each with the average body weight of each group remaining the same. Rats were housed in solid bottom plastic cages with stainless wired top. Each group was fed on different types of diet. The temperature of the animal room was maintained between 20-25˚C and weekly weight gained was monitored. Rats have free asses to diet and water throughout the experimental period, 25g food was given to each rats. Food consumption was determined by weighing food given and left over of each day. They were weighed once in a week. The four groups of animals were given different diets as per the scheme given below.

**Group Diet and Feeding Pattern**

The animals in the high fat groups were administered High-Fat High-Cholesterol diet. However, both the diets were made iso-caloric at the expense of carbohydrate. Casein was used as a source of protein and coconut oil and refined oil (groundnut oil) combination was used to provide fat. The mineral and vitamin mixes were prepared to provide essential and potentially beneficial mineral elements. The groups were as follows: Normal Group: Animals in this group were fed on standard stock diet with normal protein (10% casein), fat contents (5%) and other nutrients; HFHC Group: Animals in this group were fed on High fat (15%) high cholesterol (0.5%) diet; CMBP Group: Animals in this group were fed on High fat (15%) high cholesterol with *Commiphora mukul* bark powder (200mg/kg) and CMSP Group: Animalsin this group were fed on High fat (15%) high cholesterol with *Commiphora mukul* seeds powder (200mg/kg).

**Collection of Blood**

Collection of blood from orbital sinus was made consciously ensuring least stress to the animal. A capillary tube with polished tip was inserted by the side of the eye into the orbital plexus, so as to puncture some of the fragile vessel of the ophthalmic venous plexus. After that blood was collected into tubes. Up to 2-3 ml of blood was collected in the test tube and around 0.7 ml of blood was collected in separate test tube with addition of anticoagulant Ethylene diamine tetra acetic acid (EDTA).

**Collection of Tissue Sample**

At the end of 60 days experimental period, food was withheld from the animals overnight. Thereafter, the animal was killed by cervical dislocation. The liver, kidney, heart and brain were removed and washed with ice cold saline solution chilled by keeping over ice slabs, weighed and immediately processed for biochemical analysis. They were flushed by ice cold saline, was extensively, freed of adhering connective tissue, blot dried and weighed.

**Laboratory Investigations**

The high lipid build up was created in rats by feeding high fat high cholesterol diet. The animals experiment was designed to study the effect of high fat diet on the body and organ weight, relative liver size, food consumption. In biochemical evaluation such as total protein, albumin and lipid profile status of albino wister rats were assessed. The results were statically analysed by using Student t-test. The influence of *Commniphora mukul* bark and seeds powder based diets of experimental groups were determined on the other hand.

The experimental objectives were taken place, the body weight; organ weights, relative liver size and food consumption were measured. The bio-chemical evaluation involve the tests such as- total protein[14], albumin[14], total cholesterol[15], HDL and LDL by the method of[16], triglycerides[17] free fatty acids[18] and phospholipid[19] on both the serum and liver tissues of rats.

**Statistical Analysis**

Results are presented as mean±SD. Statistical analyses between two groups were performed by using Student's t-test. $P < 0.05$ was considered significant for all analysis. The comparison between HFHC group and experimental group were done to assess the difference among them.

## RESULTS

The results consist of body weight, organs weight, relative liver size and food consumption of each animals group. The biochemical evaluation includes the results of total protein, albumin, total cholesterol (HDL and VLDL), triglycerides, phospholipid and free fatty acids of serum and tissues of the rats group.

**Effect of CMP on Body Weight**

Table No.1 depicted the effect of *Commniphora mukul*" bark and seeds powder based diet on high fat fed rat body weights. The mean body weight of animals in groups A, B, C and D showed the gradual increase in weight. The table represented the difference between initial and final weight of fed rats. The mean body weight of rats took the significant increase from 91.6±13.29g to 110.0±12.64g in HFHC when compared with normal. No significant differences were found in between the experimental groups C and D when compared with group B at 0.05 level.

**Effect of CMP on Organ Weights**

Table No.2 gives an account of the effect of bark and seeds powder based diet on high fat fed rat organ weights. The mean weight of liver, kidney, heart and brain of animals in different group showed no specific changes in the organs weight. No significant differences in mean organs weight have been found between the experimental groups C and D when compared with HFHC group at 0.05 level. Likewise, no significant changes have been noticed in the above parameters on comparing normal fat group with HFHC group.

**Relative Liver Size and Food Consumption**

Table No.3 gives an account of the effect of bark and seeds powder based diet on high fat fed rat relative liver size and food consumption. Relative liver size is the weight of liver as the percentage of total body weight of the animals. An increase in mean relative liver size was noticed as a result of consumption of HFHC diet. There were significant differences in between HFHC (9.3±1.54) as compared to normal group (5.8±0.70) at 0.05 level. The incorporation of bark and seeds powder along with HFHC diet showed the significant decreased in the liver size in experimental groups C and D (7.9±2.74 and 8.3±1.20) respectively as compared to group B. No significant difference showed in group C and D when compared with group B.

Relative food consumption was assessed by calculating the food consumption per gram body weight of the animal. The food consumption did not register any significant changes in all the dietary groups irrespective of various experimental diets. The mean food consumption showed the significant changes from 6.3±0.51g in group A to 7.0±0.60g in group B. Although, there were a significant difference between HFHC and normal group. In a similar way HFHC diets incorporated with bark and seeds powder fed by the experimental groups C and D (7.3 ±0.22 and 7.5± 0.54) respectively marks the increase in value of food consumption as compared to group B. But no significant changes have been predicted in between HFHC group and experimental group.

## BIOCHEMICAL EVALUATION

**Total Protein and Albumin**

Table No.4 showed the effect of *Commniphora mukul"* bark and seeds powder based diets on high fat fed rat serum protein and albumin respectively. The mean serum protein of animals in HFHC group (5.4 ±0.22 g/dl) were decline as compared to normal group (7.3 ±0.30 g/dl). Thus, the significant difference were there in between the HFHC and normal group at 0.05 level. Gradually, the changes have been noticed at experimental groups, the mean of serum protein was increased. There were a significant difference in the value of experimental groups C (6.8 ±0.60 g/dl) and D (6.4 ± 0.54 g/dl) when compared with group B. However, this accounts that the bark and seeds powder of plants

incorporated with HFHC diet showed their effect and increase the value of protein towards the normality.

The mean value of albumin depicted the significant differences in among the experimental groups C and D (4.9 ±0.51 and 4.7 ±0.48 g/dl) respectively when compared with group B (3.5 ±0.58 g/dl) at 0.05 level. However, the high fat fed groups C and D raises their value towards the normal fed group (5.2 ±0.50). Simultaneously, the significant changes have been noticed when HFHC group compared with normal group.

**LIPID LIPO-PROTEIN**

**Serum total cholesterol, serum HDL and LDL cholesterol**

Table No.5 gives an account of the effect of *Commniphora mukul"* bark and seeds powder diet on high fat fed rats serum total cholesterol, serum HDL-C and LDL-C respectively. The mean value of cholesterol showed the significant difference in between HFHC (109.1±11.12) and normal (76.2±11.43) group at 0.05 level. The mean cholesterol value of animals in groups C and D showed the decline towards the value of normal group. Therefore, there was a significant difference between the group B when compared with groups C and D.

The mean value of HDL-C showed the significant difference in between HFHC (12.9±4.38) group when compared with normal (28.4±1.60) group at 0.05 level. The mean value of animals in experimental groups lies in range of 27.5±7.81and 24.4±9.91where as the range of HFHC group was 12.9±4.38. This depicted that the experimental diet along with bark and seeds powder affect the range of cholesterol and raise the value of HDL-C too. Hence, there were a significant difference in between the experimental groups C and D when compared with HFHC fed group.

The mean value of LDL-C showed the significant difference in between HFHC (67.7±8.32) group in comparison to normal (31.4±6.85) group at 0.05 level. The mean value of LDL-C of experimental groups lies in range of 36.3±4.34 and 47.2±3.51where as the range of HFHC group was 67.7±8.32. This depicted that the experimental diet along with bark and seeds powder effect the range of cholesterol and lowers the value of LDL-C. Thus, there were a significant difference between the experimental groups C and D when compared with HFHC fed group.

**Serum Free Fatty Acids, Triglycerides and Phospholipid**

Table No.6 depicted the effects of high- fat high cholesterol diet and its modification by incorporation of "*Commniphora mukul"* bark and seeds powder on serum free fatty acids, triglycerides and phospholipid status. The mean value of free fatty acid showed that there were significant difference in HFHC (16.7±0.29) group when compare with normal (10.3±1.10) group at 0.05 level. Likewise, significant difference has been noticed in between experimental groups C and D when compare with group B. Results revealed that the high-fat high cholesterol diet along with bark and seeds powder decreases the range towards the normal group whereas the HFHC group increases there range beyond the normal. Therefore, this depicted that the FFA level were decline when the rats were fed by both the powder.

The mean value of triglycerides showed that there were significant difference in HFHC (142.8±37.12) group when compare with normal (81.9±23.04 mg/100ml) group at 0.05 level. Likewise, significant difference has been noticed in between experimental groups C and D when compared with group B. The mean value of triglycerides in groups C and D showed a reduction in the value and riches the range of the group A.

The mean value of phospholipid showed that there were significant differences in HFHC (151.8±27.78) group when compared with normal (127.0±41.73) group at 0.05 level. Likewise, significant difference has been noticed in between experimental groups C and D when compared with group B. The mean value of phospholipid in groups C and D showed a reduction in the value and reaches the range of group A.

**Tissue Cholesterol, Triglycerides and Phospholipid**

Table No.7 gives an account of the effect of *Commniphora mukul"* bark and seeds powder based diet on high fat fed rats mean value of tissue cholesterol, triglycerides and phospholipid respectively. The significant difference has been noticed in between the tissue cholesterol level of HFHC (132.1±34.46) group when compared with normal (83.2±11.43) group at 0.05 level. Simultaneously, the mean value of tissue cholesterol of animals in groups C and D were decline towards the range of normal as compared to groups B. The significant differences in mean value of cholesterol have been found by the experimental groups C and D when compared with group B. However, the experimental groups decreases their range towards the normal group which depicted that the powder of plants where effective.

The mean value of tissue triglycerides represented that there were significant difference in between HFHC (154.1±27.78) group when compared with normal (127.0±41.73) group at 0.05 level. Likewise, significant difference has been found in between group C and D when compared with group B. The value of triglyceride decreases from 154.1±27.78 to 128.1±32.77 which depicted that there were significant differences in mean value of triglycerides in between the experimental group and HFHC group.

The mean value of tissue phospholipids showed the significant difference in between HFHC (2327±721.51) group when compared with normal (1827±40.10) group at 0.05 level. No significant difference has been found by the experimental groups C (2084.4±684.25) when compared with group B whereas group D showed the significant difference.

**DISCUSSIONS**

Lipid profile of the diabetic animal is important because dyslipidemia or hyperlipidemias are the associated problems. Hyperlipidemia is a major risk factor for heart disease, the leading cause of death. It is also considered as high cholesterol, hypercholesterolemia. In the present investigations impact of supplementation of bark and seeds of powder *Commniphora mukul* showed the effect on lipid profile estimated. Supplementation of *Commniphora mukul* powders exerted a significant impact on TC, HDL-C, LDL-C, FFA and TG on HFHC rats. *Commniphora mukul* powder reduces the serum TC from 109.1(HFHC) to 88.6(CMBP) and 89.2(CMSP), serum HDL-C level increased from 12.9(HFHC) to 27.5(CMBP) and 24.4(CMSP) and serum LDL-C were decreased from 67.7(HFHC) to 36.3(CMBP) and 47.2(CMSP). The value of serum FFA was reduces their value from 16.7(HFHC) to 11.5(CMBP) and 11.2(CMSP) and serum TG also reduced their value from 142.8(HFHC) to 95.28(CMBP) and 123.9(CMSP).The value of serum phospholipid was also reduces their value from 151.8(HFHC) to 132.5(CMBP) and 129.7(CMSP). Bishri and Attas (2013)[20] observed a significant reduction in the elevated plasma serum lipids including TG, TC and LDL-C, modulated the decrease in HDL-C. Similarly, Bellamkonda *et.al., (*2011)[21] also reported the same result that the plasma serum TG, TC, LDL-C were reduces their value and HDL-C was elevated their value in STZ induced diabetic rats. On the other hand the investigation of lipid profile where also analyzed in liver tissue homogenate. *Commniphora mukul* showed a significant impact on lipid profile (TC, TG and PPL). *Commniphora mukul* reduces the TC level from 132.1(HFHC) to 96.7(CMBP) and 90.1(CMSP), tissue TG also reduces from 154.1(HFHC) to 130.4(CMBP) and 128.1(CMSP) and tissue phospholipid also reduces the elevated value from 2327.0(HFHC) to 2084.4(CMBP) and 1977.5(CMSP) respectively. Ramesh *et. al., (*2012)[22] supplemented *Commniphora mukul* resin to STZ induced diabetic rats and analyzes their effects on liver and heart tissues. The result depicted that there were reduction in elevated liver and heart tissue lipid profile (TG, TC, PPL and FFA). In the same way, Bhardwaj *et. al.,* (2014)[23] investigated the same study by using *Commniphora mukul* resin against STZ induced diabetic rats and

analyze the effect on liver tissue. The significant impact was noticed on the TG, TC, LDL-C and VLDL level of liver tissue lipid were decreases. The HDL-C liver tissue level was increased significantly. Correspondingly, Sudhakara *et. al*., (2015)[24] also stated a significant impact on tissue lipid profile (PPL, TG and TC) on STZ induced diabetic rats by supplementing *Commniphora mukul* gum resin.

**Table No.1: Effect Of HFHC Diet and HFHC + *"Commniphora mukul"* Bark and Seeds Powder Diet on Mean Body Weights**

| S.No | Dietary Groups | Initial Wt. (g) | Final Wt. (g) |
|---|---|---|---|
| 1 | NORMAL (A) | 85.8±1.43 | 91.6±13.29 |
| 2 | HFHC (B) | 80.8±0.86 | 110.0±12.64 [a] |
| 3 | HFHC+CMBP (C) | 95.8±1.27 | 100.0±12.24 [NS] |
| 4 | HFHC+CMSP (D) | 90.6±0.71 | 108.0±11.69 [NS] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.2: Effect of HFHC Diet and HFHC + *"Commniphora mukul"* and Bark and Seeds Powder Diet on Different Body Organ Weights**

| S.No | Dietary Groups | Liver Wt. (g) | Kidney Wt. (g) | Heart Wt. (g) | Brain Wt.(g) |
|---|---|---|---|---|---|
| 1 | NORMAL (A) | 5.2±0.63 | 1.7±0.40 | 0.7±0.07 | 1.3±0.13 |
| 2 | HFHC (B) | 10.1±1.17 [NS] | 2.2±0.08 [NS] | 0.8±0.13 [NS] | 2.6±0.19 [NS] |
| 3 | HFHC+CMBP (C) | 9.1±2.83 [NS] | 1.7±0.11 [NS] | 0.8±0.08 [NS] | 2.4±0.32 [NS] |
| 4 | HFHC+CMSP (D) | 8.9±0.67 [NS] | 2.1±0.43 [NS] | 0.8±0.07 [NS] | 2.1±0.34 [NS] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.3: Effect of HFHC Diet and HFHC+*"Commniphora mukul"* Bark and Seeds Powder Diet on Relative Liver Size and Food Consumption**

| S.No | Dietary Groups | Relative liver size (liver wt. g/100g body wt.) | Food Consumption (g) |
|---|---|---|---|
| 1 | NORMAL (A) | 5.8±0.70 | 6.3±0.51 |
| 2 | HFHC (B) | 9.3±1.54 [a] | 7.0±0.60 [a] |
| 3 | HFHC+CMBP (C) | 7.9±2.74 [NS] | 7.3±0.22 [NS] |
| 4 | HFHC+CMSP (D) | 8.3±1.20 [NS] | 7.5±0.54 [NS] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.4: Effect of HFHC Diet and HFHC + *"Commniphora mukul"* Bark and Seeds Powder Diet on Total Protein and Albumin Levels**

| S.No | Dietary Groups | Total Protein (g/dl) | Albumin (g/dl) |
|---|---|---|---|
| 1 | NORMAL (A) | 7.3 ±0.30 | 5.2 ±0.50 |
| 2 | HFHC (B) | 5.4 ±0.22 [a] | 3.5 ±0.58 [a] |
| 3 | HFHC+CMBP (C) | 6.8 ±0.60 [a] | 4.9 ±0.51 [a] |
| 4 | HFHC+CMSP (D) | 6.4±0.54 [a] | 4.7±0.48 [a] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.5: Effect of HFHC Diet and HFHC + *"Commniphora mukul"* Bark and Seeds Powder Diet on Mean Serum Lipid Level**

| S.No | Dietary Groups | Total Cholesterol (mg/dl) | HDL-C (mg/dl) | LDL-C (mg/dl) |
|---|---|---|---|---|
| 1 | NORMAL (A) | 76.2±11.43 | 28.4±1.60 | 31.4±6.85 |
| 2 | HFHC (B) | 109.1±11.12 [a] | 12.9±4.38 [a] | 67.7±8.32 [a] |
| 3 | HFHC+CMBP (C) | 88.6±12.19 [a] | 27.5±7.81 [a] | 36.3±4.34 [a] |
| 4 | HFHC+CMSP (D) | 89.2±16.19 [a] | 24.4±9.91 [a] | 47.2±3.51[a] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.6: Effect of HFHC Diet and HFHC + *"Commniphora mukul"* Bark and Seeds Powder Diet on Mean Serum Lipid Level**

| S.No | Dietary Groups | Free Fatty Acid (mg/100ml) | Triglycerides (mg/100ml) | Phospholipid (mg/100g) |
|---|---|---|---|---|
| 1 | NORMAL (A) | 10.3±1.10 | 81.9±23.04 | 127.0±41.73 |
| 2 | HFHC (B) | 16.7±0.29 [a] | 142.8±37.12 [a] | 151.8±27.78[a] |
| 3 | HFHC+CMBP (C) | 11.5±2.41 [a] | 123.9±30.94 [a] | 132.5±27.06 [a] |
| 4 | HFHC+CMSP (D) | 11.2±1.90 [a] | 95.3±31.85 [a] | 129.7±32.77 [a] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Table No.7: Effect of HFHC Diet and HFHC + *"Commniphora mukul"* Bark and Seeds Powder Diet on Mean Tissue Lipid Level**

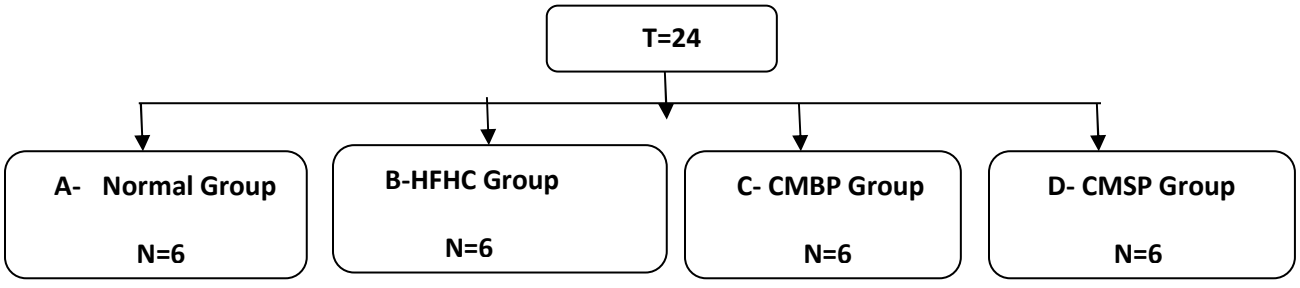
| S.No | Dietary Groups | Total Cholesterol (mg/100g) | Triglycerides (mg/100g) | Phospholipid (mg/100g) |
|---|---|---|---|---|
| 1 | NORMAL (A) | 83.2±11.43 | 127.0±41.73 | 1827±401.10 |
| 2 | HFHC (B) | 132.1±34.46 [a] | 154.1±27.78[a] | 2327±721.51 [a] |
| 3 | HFHC+CMBP (C) | 96.7±40.79 [a] | 130.4±27.06 [a] | 2084.4±684.25[NS] |
| 4 | HFHC+CMSP (D) | 90.1 ±13.01[a] | 128.1±32.77 [a] | 1977.5±359.30 [a] |

**[**Value: Mean ± SD of 6 rats in each dietary group**]**

Group A compare with groups B, group B compare with groups C and D.

[a]p≤0.05 Significant NS: Non-Significant (p≥0.05)

**Experimental Group of Animal**



## CONCLUSION

The results obtained in present study may conclude that the *Commniphora mukul* bark and seeds powder has significant anti-hyperlipidaemic potential against High Fat High Cholesterol Diet induced experimental rats. *Commniphora mukul* are believed to be hypolipidaemic due to presence of bio-active component i.e. Guggulsterones E and Z which was the most important components and due to some phytochemical compounds also. As it reduces the free radical formation and accumulation of fats in the body. It is beneficial for many diseases due to its medicinal diseases curing properties.

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## CONFLICT OF INTEREST

We declared that we have declared no conflicts of interest.

## BIBLIOGRAPHY

1. Adekunle A S, Adedeji A L, Oyewo E O, Adedosu O T, Omotoso A T. Hyperlipidemia induced by atherogenic diet enhanced oxidative stress in the kidney and inflammatory responses: an in-vivo study, *Asian J. Nat. Appl. Sci,* 2(1), 2013, 82-93.
2. Patil V D, Nayak U R and Sukh Dev. "Chemistry of Ayurvedic Crude Drugs-I: Guggulu (Resin from Com- miphora mukul)-1: Steroidal Constituents," *Tetrahedron,* 28(8), 1972, 2341-2352.
3. Bose S and Gupta K C. "Structure of C. mukul -Part II. Structure of the Degraded Gum," *Indian Journal of Che- mistry,* 2(2), 1964, 156-158.
4. Fatope M O, Al-Burtomani S K S, Ochei J, Abdulnur A O, Al-Kindy M Z and Takeda Y, "Muscanone: A 3-O-(1",8",14"-Trimet Hylhexadecanyl) Naringenin from Commiphora wightii," *Phytochemistry,* 62(8), 2003, 1251-1255.
5. Patil V D, Nayak U R and Dev S, "Chemistry of Ay- urvedic Crude Drugs-III: Guggulu (Resin from Com- miphora mukul)-3 Long-Chain Aliphatic Tetrols, a New Class of Naturally Occurring Lipids," *Tetrahedron,* 29(11), 1973, 1595-1598.
6. Purushothaman K K and Chandrasekaran S. "Guggul- sterols from Commiphora wightii (Burseraceae)," *Indian Journal of Chemistry,* 14B(10), 1976, 802- 804.
7. Bajaj A G and Dev S, "Chemistry of Ayurvedic Crude Drugs," *Tetrahedron,* 38(14), 1982, 2049- 2054.
8. Verma N, Singh S K and Gupta R C, "Simultaneous Determination of the Stereoisomers of Guggulsterome in Serum by High Performance Liquid Chromatography", *Journal of Chromatography,* 708(1-2), 1998, 243-248.
9. Kimura, Yoshikawa M, Kobayashi S, Sugihara Y, Suzuki, H. Oominami M, Murakami T, Matsuda H and Doiphode V V, "New Triterpenes, Myrrhanol A and Myrrhanone A, from Guggul-Gum Resins, and their Potent Anti-Inflammatory Effect on Adjuvant-Induced Air-Pouch Granuloma of Mice," *Bioorganic and Medicinal Chemis- try Letters,* 11(8), 2001, 985-989.
10. Mesorb B, Nesbitt M R and Pandey C R. "High Per- formance Liquid Chromatographic Method for Finger-printing and Quantitative Determination of E- and Z- Guggulsterones in Commiphora wightii," *Journal of Chromatography,* 720(1-2), 1998, 189-196.
11. Kasera P K and Prakash J. "Ecology and Cultivation Practices of Guggul (Commiphora wightii): An Endangered Medicinal Plant of the Thar Desert in India,"

In: Majumadar D K, Govil J N, Singh V K and Shar- ma R K. Eds., Recent Progress in Medicinal Plants, *Plant Bioactives in Traditional Medicine, Stadium Press LLC, Houston,* 9(3), 2005, 403-423.

12. Jain A and Gupta V B. "Chemistry and Pharmacologi- cal Profile of Guggul-A Review," *Indian Journal of Tra- ditional Knowledge,* 5(4), 2006, 478-483.
13. Ramawat K G, Mathur M, Dass S and Suthar S. "Gug- gulsterone: A Potent Natural Hypolipidemic Agent from Commiphora wightii-Problems, Perseverance, and Pros- pects," In: Ramawat K G and Merillon J M. Eds., *Bio- active Molecules and Medicinal Plants, Springer, Hei- delberg,* 2008, 101-121. doi:10.1007/978-3-540-74603-4_5.
14. Dumas B T. *In vitro* determination of total protein and albumin in serum, *Clin Chem Acta,* 31(1), 1971, 87-96.
15. Wybenga D R, Pileggi V J, Dirstine P H, Giorgio D J. Direct manual determination of serum total cholesterol with a single stable reagent. *Clin-Chem,* 16(12), 1970, 980-984.
16. Friedewald W T, Levy R I and Fredrickson D S. Estimation of the concentration of low density lipoprotein in plasma, without the use of preparative ultracentrifuge, *Clin. Chem,* 18(6), 1972, 499-502.
17. Mc Gowan M W, Artiss J D, Zak B. Estimation colorimetry of lecithin and sphingomyelin in aqueous solution, *Clin.Chem,* 29(8), 1983, 589-594.
18. Lowry R R, Tinsley I J. Rapid colorimetric determination of free fatty acid, *J. Am.Oil Chem Soc,* 53(7), 1976, 470-472.
19. Chen P S, Toribara T Y and Warner H. Micro determination of phosphorus, *Analyt. Chem.*, 28(3), 1956, 1756-1758.
20. Bishri WM-Al and Attas OS-Al. Guggul Resin Extract Improve hyperglycemia and Lipid Profile in Streptozotocin Induced Diabetes Mellitus in rats, *Life Science Journal,* 10(1), 2013, 2735-41.
21. Bellamkonda R, Rasineni K, Singareddy S R, Kasetti R B, Pasurla R, Chippada A R, Desireddy S. Antihyperglycemic and antioxidant activities of alcoholic extract of Commiphora mukul gum resin in streptozotocin induced diabetic rats, *Pathophysiology*, 18(4), 2011, 255-261.
22. Ramesh B, Karuna R, Sreenivasa R S, Haritha K, Sai M D, Rao S B, Saralakumari D. Effect of Commiphora mukul gum resin on hepatic marker enzymes, lipid per oxidation and antioxidants status in pancreas and heart of streptozotocin induced diabetic rats, *Asian Pacific Journal of Tropical Biomedicine*, 2(11), 2012, 895-900.
23. Bhardwaj Madhvi, Arvind Soni, Sudhansu Mishra, Sandeep Tripathi. Protective effect of Commiphora wightii in metabolic activity of streptozotocin (STZ) induced diabetes in rats, *Journal of Diabetes and Endocrinology,* 5(3), 2014, 19-28.
24. Sudhakara G, Ramesh B, Mallaiah P, Manjunatha B, Desireddy Saralakumari. Protective Effect of Commiphora Mukul Gum Resin on Brain in Streptozotocininduced Diabetic Rats, *International Journal of Pharmacy and Pharmaceutical Sciences,* 7(9), 2015, 406-411.

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