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Evaluation of Anti-Obesity Potential of *Commiphora Mukul* the Indian Bdellium Plant

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Abstract:

The prevalence of obesity is a global health problem. Obesity or abnormal fat accumulation is a risk factor for many disease including heart related disorders and many others. Proper designed diet is a preliminary treatment mainly focuses on reduced food intake. *Commiphora mukul* is also known as guggul tree and is largely located in drought areas of Pakistan, Bangladesh and India. Principal ingredient Guggulu is a part of of several ayurvedic formulations used for controlling obesity. *Commiphora mukul* contains longchain aliphatic tetrols, starches, diterpenoids, steroids, triterpenoids, aliphatic esters, lignans, ferulates, and an assortment of inorganic particles other than minor measures of sesamin and some unidentified constituents. Here authors have evaluated the anti-obesity potential of *Commiphora* mukul and found promising results which indicate medicinal benefits of *Commiphora mukul* in treatment of obesity.

INTRODUCTION:

The World Health Organization (WHO) has identified four major risk factors for the diseases; use of tobacco, physical inactivity, improper and unhealthy diet, and the excessive use of alcohol Among these the physical inactivity and improper and unhealthy diet, typically find their expression in overweight and obesity. Worldwide, it is found that the prevalence rate for obesity between 1980 and 2013 was increased up to 28 % in adults and 47% in children, and about 2.1 billion persons were considered as obese [1]. Although, the increased rate was found both in developed as well as developing countries, yet it was comparatively higher in developed countries. It was amazing to analyze that the males were more obese than the females in

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developed countries, while the results were opposite in developing countries. In the United - States, the prevalence rate of obesity is about 13 % for boys and 14 % for girls up to age of 20 years, and which increase up to 32 % for men and 34 % for women after the age of 20 [2,3].

Commiphora mukul is a significant antiquated restorative plant of the *Burseraceae* family. *It* is also known as guggul tree and is largely located in drought areas of Pakistan, Bangladesh and India. In India, it is found in Assam, Gujarat, Rajasthan, Karnataka and Madhya Pradesh. It is a small, thick tree with prickly branches and delivers a yellowish gum sap (guggulu) in little channels situated all through its bark. The trees are tapped by making a cut on the bark. The resin, which streams out, is permitted to solidify before it is gathered. The tree is tapped from November to January and the pitch is gathered through May to June. A guggul tree obtains between 250-500 Gms of dry resin during every assortment season [4-6].

Figure: 1 *Commiphora mukul* plant with leaves and fruits

MATERIAL AND METHODS:

Collection of plant material:

The fresh leaves of *Commiphora mukul* were collected from the local area of Distt. Chitoor Andhra Pradesh in the month of November, 2018.

Identification and Authentification:

The collected plant parts was identified and authenticated from chitoor andhra Pradesh. A voucher specimen [1542] (*Commiphora mukul)* was deposited in herbarium of India.

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Extraction of *Commiphora mukul leaves*:

Powdering: The fresh and fully ripped leaves of *Commiphora mukul* were shade dried for one week, followed by powdering manually using motar and pestle.

Sieving: The dried powdered leaves were passed through a 22 mesh sieve to maintain uniform particle size of the drug and to remove leaf hairs, if any.

Soxhlation: The dried, powder plant material (500 g) was extracted with hydroalcoholic (30:70) solvent and ethanol, separately at 60^0C for 24 h using a soxhlet apparatus. The collected masses were subject to drying to evaporate the excess of solvent. The collected extracts were termed as hydroalcoholic extract of *Commiphora mukul (HACM)* and ethanolic extract of *Commiphora mukul leaves* respectively (ECM) [7-8].

Phytochemical screening of *Commiphora mukul* leaf extracts:

All the extracts i.e. hydroalcoholic extract of *Commiphora mukul (HACM),* ethanolic extract of *Commiphora mukul* (ECM), were evaluated for the presence of various phytoconstituents qualitatively. Before experimental work, all the glassware were thoroughly cleaned by good quality detergent, washed and dried in oven. The analysis was carried out using freshly prepared reagents [9].

Evaluation of Antioxidant Property of Plant Extracts:

The antioxidant property of hydroalcoholic and ethanolic extract of *Commiphora mukul* leaves was investigated against the scavenging potential of 1, 1- diphenyl- 2- picryl hydrazyl (DPPH), as methanolic solution (Purple colored solution). The anti oxidants on reacting with DPPH, convert it into the 1,1- diphenyl- 2- picryl- hydrazine (Yellow colored solution [10-13]. The degree of discoloration (from purple to yellow) indicates the scavenging activity of the drugs. The absorbance was recorded at 517 nm.

Evaluation of Anti-obesity Activity:

The hydroalcoholic and ethanol extract of *Commiphora mukul* leaves were evaluated for their antiobesity effect according to the established method in animals using high fat diet induced obesity model in rats [14].

Selection of animal species: Healthy young adult (8 to 10 weeks old), male rats (200-250 gm) were selected for the experimental purpose.

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Housing and feeding conditions: The animals were kept in polypropylene cages, 6 in each cage. Animal house was maintained at temperature range of 22ºC ± 3ºC and relative humidity at 50-60%. The animals were acclimatized on 12 hours light, 12 hours dark cycle. Conventional laboratory diet was used for feeding with water add libitum. The rats were allowed to acclimatize to the experimental room conditions for a period of seven days [15-17].

Grouping of animals: Total 42 rats were selected for the study purpose. They were divided randomly into eleven groups, each containing 06. The grouping was done as mentioned in table no. 1

Groups	Treatment (mg /Kg, BW)	No. of animals
Groups 1	Received only standard pellet diet (Normal Control Group)	**6**
Groups 2	Received only prepared high fat diet (Positive Control Group)	**6**
Groups 3	Received prepared high fat diet + HACM (400)	**6**
Groups 4	Received prepared high fat diet + ECM (400)	**6**
Groups 5	Received prepared high fat diet + HACS (400)	**6**
Groups 6	Received prepared high fat diet + ECS (400)	**6**
Groups 7	Received prepared high fat diet + Orlistat (25)	**6**

Table no.: Animal group for evaluation of anti-obesity activity

PROCEDURES:

Before commencing the experimental procedure, the weight, and waist circumference of the individual animals of the respective group was measured. It was considered as day first values. The animals of respective groups were treated as mentioned in table no. 7. The changes in body weight, and waist circumference of the animals was subsequently recorded on day 7^{th} , day 14^{th} , day 21^{st} , day 28^{th} , day 35^{th} and day 42^{nd} . The determination of serum lipid profile is an important aspect of studies related with obesity. To investigate and establish anti obesity effect of collected extracts, it is important to analyze various serum lipid profile in experimental rats on different days [18].

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Keeping in view the safety of experimental animals, the blood was collected on the day I and subsequently at the interval of two weeks, i.e. on day14th, day 28th and day 42nd, from retro-orbital puncture, under light anesthesia, using anticoagulant (EDTA) coated glass capillaries***).*** The collected blood samples were used for analysis of biochemical parameters (Serum lipid profile). All the groups were treated orally, using intubation tube daily at morning hours (10 to 11 AM). The extracts and standard drug (orlistat) were dissolved in normal saline and accordingly dose was adjusted. The free access for the feed item and water was kept during whole experiment. The fresh feed material and water was placed for animals daily early in the morning and evening, and residual feed part was also removed to maintain hygienic conditions [19].

RESULTS AND DISCUSSION:

The percentage yield of the collected extracts of Hydroalcoholic extract and Ethanolic extract *Commiphora mukul* were found 19.6 and 15.4% respectively. The standard was gallic acid and the graph is given in figure. Absorbance recorded for hydroalcoholic extract of *Commiphora mukul* . And total phenol content is given in table.

Table No: 10 Absorbance recorded for Standard Gallic Acid Curve (Data are represented as mean ± S. E. M, where n=3)

Sr. No.	Concentration (µg/ ml)	Absorbance of STD (Gallic Acid)
1	10	0.138 ± 0.011
2	20	0.211± 0.007
3	30	0.299±0.021
4	40	0.388±0.019
5	50	0.468±0.006
6	60	0.571±0.007
7	70	0.692±0.018
8	80	0.767±0.022

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9	90	0.878±0.010
10	100	0.945±0.013

Table No:11 Absorbance recorded for hydroalcoholic extract of *Commiphora mukul* (Data are represented as mean ± S.E.M, where n=3).

Sr. No.	Concentration (µg/ ml)	Absorbance for HACM
1.	50	0.398 ± 0.012
2.	100	0.467± 0.008
3.	200	0.579± 0.011
4.	300	0.659± 0.009
5.	400	0.771 ± 0.011
6.	500	0.847 ± 0.007

Table No: 12Absorbance recorded for ethanol extract of *Commiphora mukul* (Data are represented as mean ± S.E.M, where n=3

Sr. No.	Concentration (µg/ ml)	Absorbance for ECM
1.	50	0.298 ± 0.006
2.	100	0.368 ± 0.012
3.	200	0.487 ± 0.009
4.	300	0.591 ± 0.011
5.	400	0.667 ± 0.018
6.	500	0.781 ± 0.013

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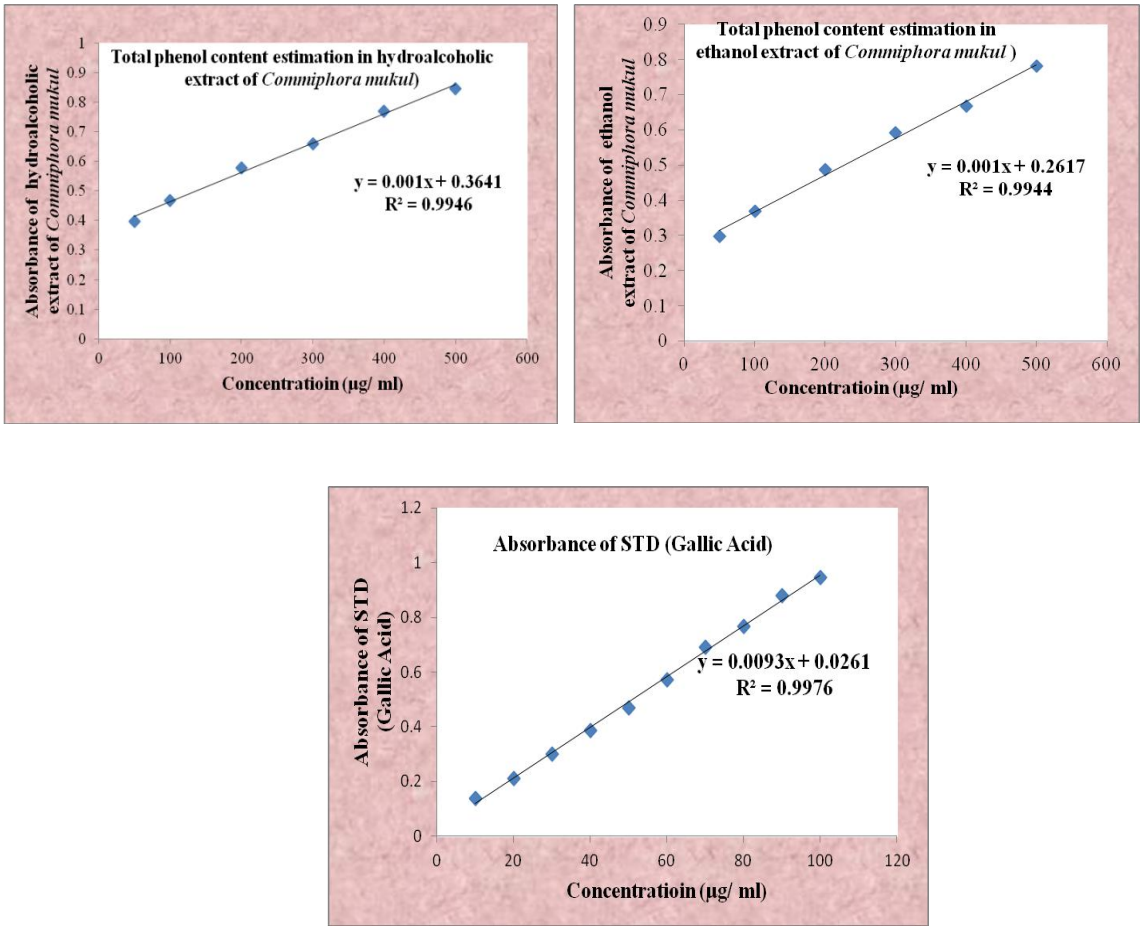

Fig. No. 9 Estimation of total phenol content in hydroalcoholic and alcoholic extract of *Commiphora mukul* and standard curve of Gallic Acid

CONCLUSION:

The present research work demonstrates the potential anti obesity activity of ethanol and hydroalcoholic extracts of C*ommiphora Mukul* (HACM). The anti obesity activity was evaluated by using high calorie /high fat diet induced obesity in animal models. The results were demonstrating significant anti obesity activity of the plant extracts in the tested animal models which has been supported by the results of biological measurements. Histopathological studies like serum lipid profiles, total cholesterol levels(TDL), serum triglyceride levels(STL), high density lipoproteins(HDL), low density lipoproteins(LDL),and very low density lipoproteins(VLDL) are conducted with blood serum in both the models to demonstrate effect of plant extract in animals. Further characterizations are required to prove the mechanism of action.

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