Evaluation of Antiobesity Activity of Various Plant Extracts

D'Mello P. M¹, Darji K.K¹, Shetgiri P.P¹

¹Department of Pharmacognosy and Phytochemistry, Prin. K.M. Kundanani college of Pharmacy, Cuffe parade, Colaba, Mumbai-400005, India.

ABSTRACT

Obesity is one of the major factors contributing to increase prevalence of various pathophysiological disorders like hyperlipidemia, diabetes mellitus and congestive heart diseases. Attempts made to reduce body fat can be positively linked with lower risk involved in these diseases. The present paper emphasizes on study related to the antiobesity effect of plant extracts in Albino Wistar rats fed with high atherogenic diets. The effect of plants extract like Vitis vinifera, Oroxylum indicum, Garcinia indica and a phytoconstituent isolated from sugarcane wax i.e. polycosinol were evaluated on parameters like body weight, organ weight and biochemical parameters like serum glucose. The plant extracts exhibited good antiobesity effect when compared with the diseased state group fed with high cholesterol rich diet. The blood sugar level and body organ weights were also found to be reduced significantly as compared to normal group. All these extracts are rich in polyphenols which may be responsible for their antiobesity activity.

Key words: Obesity, Polycosinol, Vitis vinifera, Oroxylum indicum, Garcinia indica.

INTRODUCTION

Obesity is a serious health problem worldwide leading to several pathophysiological disorders like hyperlipidemia, diabetes mellitus and congestive heart diseases. Among the multiple factors contributing to its etiology are the sedentary life style, lack of exercise, endocrine disorders, physiological and psychological factors, smoking and pregnancy at a later age, certain drugs that increase body weight, mental illness and the consumption of energy rich junk foods.[1,2] Obesity increases the mechanical and metabolic load on the myocardium, thus increasing myocardial oxygen consumption.[3] Increased fat deposition may be a result of the predominant consumption of hyperlipidemic diets. The primary treatment for obesity is dieting and physical exercise. To supplement this, or in case of failure, anti-obesity drugs may be taken to reduce appetite or inhibit fat absorption. Also the non availability of drugs for its treatment is a major concern as drugs that reduce obesity can also have implications towards liver, heart and spleen.[4,5] Natural products identified from traditional medicinal plants have always presented an exciting opportunity for the development of newer therapeutic agents. The objective of the present study was to evaluate antiobesity effect of various plant extracts like Vitis vinifera, Oroxylum indicum, Garcinia indica and a phytoconstituent isolated from sugarcane wax i.e. polycosinol by atherogenic diet induced obesity model in Albino Wistar Rats.[6,7]

MATERIAL AND METHODS

Collection of plant material and Extraction: Garcinia indica fresh fruits were collected from forest of Ratnagiri District of Maharashtra, India and authenticated by Dr.A.M.Majumdar from Agharkar Research Institute, Pune, Maharashtra. The fruits were cut into two pieces and sun dried. The dried material was powdered and was subjected to soxhlet extraction using methanol as a solvent. Vitis Vinifera commonly known as black Grapes were obtained from local sources, the fruits were dried and subjected to soxhlet extraction using methanol as a solvent. Oroxylum indicum was obtained from local sources and authenicated by Dr. Naik at Nicholas Piramal Laboratories Ltd and subjected to soxhlet extraction using methanol as a solvent. Policosanol was isolated from sugar cane wax by known methods.[8] Methanol was evaporated and the extracts reconstituted in water were used for the study.

Experimental Animals: For antiobesity study Albino Wistar Rats (120-150 gm) were obtained from Glenmark

Parameters tested and procedures
Body weight: The body weight (g) was recorded from day 1 twice a day before administration of drug for 22 days in each group.

Locomotor activity: It was observed every day before administration of plant extracts visually by placing the rat in the center table and recording the physical ambulatory changes.

Biochemical parameters: At the end of 22 days blood sugar levels was measured from serum samples using the biochemical kits.

Organ weights: The animals were sacrificed by cervical dislocation and then liver, heart, were removed and weighed.

Evaluation of antiobesity activity
Albino wistar female rats (120-150 gm) were divided into ten different groups each containing 6 animals in each which are as follows:

Group 1 Control group: Only vehicle was given to this group.
Group 2 Hyperlipidemic group: Cholesterol in coconut oil (25 mg/kg/ day) was administered to each rats of this group.
Group 3 Test group: Rats of this group were administered with Garcinia indica extract (400 mg/kg/ day) along with cholesterol in oil.
Group 4 Test group: Rats of this group were administered with Policosanol (200 mg/kg/ day) along with cholesterol in oil.
Group 5 Test group: Rats of this group were administered with Vitis vinifera extract (200 mg/kg/day) along with cholesterol in oil.
Group 6 Test group: Rats of this group were administered with Oroxylum indicum extract (200 mg/kg/day) along with cholesterol in oil.

The cholesterol in oil was given to each animal except the control group daily at 10.00 am.[9,10] The solution of extract was prepared freshly every day and given to their respective group at 3.00 pm. This process was followed for 22 days and the amount of food intake was monitored daily. At the end of experimental studies animals were fasted for 12 hr and then the blood was collected by cardiac puncture under light ether anesthesia animals were then sacrificed by ether anesthesia. The liver was isolated and preserved in 10% formalin solution.[11] The biochemical parameters were evaluated using diagnostic kits. All the results were subjected to statistical analysis using one way Anova followed by Dunnett’s multiple comparison tests against the hyperlipidemic group. The p values < 0.05 were considered significant. All the values were expressed as mean ± S.E.M and compared with control group.

RESULTS

The evaluation of antiobesity activity using cholesterol induced hyperlipidemia shows that the groups treated with plant extracts had a significant antiobesity activity. The significant reduction in the increments in body weights of the rats treated with plant extract was observed when compared with the hyperlipidemic group (Figure 1). The groups treated with plants extract had significant reduction in the levels of blood sugar than the toxicant group (Table 1). The organ weight increment is also significantly reduced in the test groups as compared to toxicant group. Animals did not posses any significant changes in ambulatory activity as compared to control group.

DISCUSSION

The groups treated with plants extract exhibited significant antiobesity activity. All this plant extracts are rich in polyphenol content which may be responsible for their significant antiobesity activity. Garcinia indica is known to contain phenolic phytochemicals like garcinol which is polyisoprenylated benzophenone and hydroxy citric acid (HCA).[12,13] Policosanol was isolated from sugarcane wax which also exhibited antiobesity activity. Vitis vinifera is another such plant rich in flavonoids like quercetin, anthocyanins, carotenes, ascorbic acid etc while Oroxylum

Whilst orthodox medicine concedes, in fact insists, that further research is necessary, the implications of these findings are exciting; suggesting that there may be many more as yet undiscovered benefits of flavonoids. As always, however, the holistic functioning of the body means that maximum benefits will only be obtained by the consumption of the widest possible variety of all these compounds.

REFERENCES


*indicum* is rich in flavones.\[14,15\] In toxicant group animals, there was significant increase in weight of liver as compared to treatment with plant extracts which indicate the fat deposition in the hyperlipidemic group leading to obesity. The least organ weight was observed in the group treated with *Garcinia indica* which has the maximum antiobesity activity. Earlier researchers have reported the role of hydroxy citric acid as an appetite suppressant which is one of the constituents of the extract of *Garcinia indica*.\[16\] The activity also could be the result of synergism between several constituents like garcinol, anthocyanins along with hydroxyl citric acid present in the extract. Plant extracts treatment group significantly reduced the blood glucose level when compared with toxicant group fed with high cholesterol. These findings suggest that extracts supplements reduce the obesity caused by high fat diet and normalize body weight. 

![Figure 1: Graph depicting antiobesity effects of various plant extracts](image-url)