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EVALUATION OF THE EFFECT OF *KURANTAKA CHURNA* (*BARLERIA PRIONITIS* LINN.) IN EXPERIMENTAL MODEL OF HIGH FAT DIET INDUCED OBESITY

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ABSTRACT

Objective/Hypothesis: *Kurantaka* (*Barleria prionitis* Linn) has Anti-obesity potential in Experimental model of High Fat Diet induced obesity. **Method:** 36 healthy wister albino of male sex weighing 180-200 gm selected for the study. High fat Diet induced obesity model is prepared by giving High Fat Diet (Coconut oil: Vanaspati ghee 2:3 proportions) for first 21st days. Then from 22nd day till 42nd day of study test drug (*Kurantaka churna*) given in various doses (90mg/kg, 180mg/kg, 270mg/kg). Weight and other biochemical parameters along with histopathological changes recorded on 0, 21st and 42nd days. **Statistical Study:** ANOVA and Post Hoc Analysis performed **Results:** All three doses 90mg/kg, 180mg/kg, 270mg/kg of *Kurantaka churna* (*Barleria prionitis Linn*) significantly showed effect on Weight, other biomedical parameter, Histopathological changes. **Conclusion:** *Kurantaka churna* (*Barleria prionitis Linn*) exhibit Anti-obesity activity in experimental model of High Fat Diet induced obesity. *Kurantaka churna* in 270mg/kg showed better results than other two doses.
Keywords: *Varunadi gana*, *Kurantaka, churna*, *Barleria prionitis*, Wister rats

INTRODUCTION

Today's unhealthy and stressful life style and wrong eating habits have lead to hazardous conditions which affects our health on physical and mental levels which leads to cause for various diseases. One of such disease is Obesity which can be correlated with *Sthoulya* in *Ayurveda*. According to WHO One person among six is obese[1.] Although it is most common yet most neglected disease[2]. However, still today there isn't found any effective medicine in modern medicine. The world is fighting to eradicate obesity with various aspects, but *Ayurved* has already described pathogenesis, signs-symptoms and effective treatment of *Sthoulya*. The *Granthakars* have grouped various *Ayurvedic* medicines named as *Mishraka Gana* to treat conditions like *Sthoulya*. *Mishraka Gana* show cu-

mulative effects mainly due to combination of Plants having nearly similar attributes. *Varunadi gana*[3] from *Ashtang Hrudhay* has *Kapha-Meda nashana* action[3]. This *gana* mentions, *Peeta Saireyaka* i.e. *Kurantaka*. *Kurantaka* (*Barleria prionitis* Linn) is easily available throughout India. Its leaves previously proved actions as against Diabetes[4] as well as Hypertension[5], which are most common complications of obesity[6]. It is needed to see its activity against Obesity.

Aim –

To evaluate *Kurantaka* (*Barleria prionitis Linn*) in an experimental model of High Fat Diet induced Obesity

Objectives:

To evaluate the effect of *Kurantaka* (*Barleria prionitis Linn*) on High Fat Diet induced Obesity model in rats using following parameters:

- Weight weekly i.e. day 0, 7, 14, 21, 28, 35, 42)
- Lipid profile: Total cholesterol, TG, HDL, LDL, VLDL (day 0, 21, 42)
- Fasting blood sugar levels.(day 0,21,42)
- Histopathological changes: Liver, adipocytes

Material

For animal experiment following materials/ equipment were taken:

Animals*:* 36 Wister rats. (Male)

Animal Source –

The required number of 36 healthy wister albino of male sex weighing 180-200 gm provided from Seth Govind Raghunath Sable (SGRS) College of Pharmacy, Saswad

Animals allowed to acclimatized for 14 days

Test drug- *Kurantaka patra churna (Leaf powder* of Barleria prionitis Linn)

Standard drug: Atorvastatin (Dose: 1.2mg/kg/day*)*

Standard pellets Standard animal diet

Preparation of High Fat Diet Material

Coconut oil –(Parachute company) & Vanspati *ghee* – **(**Dalda Company)

Vehicle for dosing –

0.5% Carboxy methyl cellulose

METHODOLOGY

Experimental study was carried out according to following steps.

Collection of drug, Authentication, Preparation of dosage forms, Standardization and physicochemical analysis, Dose determination, Preparation of High fat Diet, Preparation of animal model, Dosing, Observations followed by Statistical analysis

Test drug:

- Drug- *Kurantaka*
- Scientific name-*Barleria prionitis* Linn
- Family; Acanthaceae
- Part used: Leaves

Source of drug collection-

Kurantaka leaves were self collected from Taljai pathar, Karaj, Pune.

Authentication;

The Drug authentication done at Agharkar Research Institute ,Pune with parameters including Foreign Matter , Loss on drying at 110°C, Total Ash Content, Acid insoluble ash, Alcohol Soluble Extract, Water Soluble Extract.

Preparation of Drug and dosage form

Kurantaka leaves were collected, cleaned and dried in shade. The air dried leaves subjected to pulverizer to obtain coarse powder and was stored in airtight container. Mesh size used is 80.

Dose calculation –

Dose according to,

Ancient text for Human's =10 gm/day [7]

Rat factor = 0.018 [8]

Rat dose = Human dose * Rat factor

Hence,

Dose of *Kurantaka* = 180mg/kg

Lower dose = 90 mg/kg
Higher dose= 270 mg/kg

Preparation of Dose-
0.25 gm Carboxy Methyl Cellulose (CMC) triturated in 100 ml distel water and doses calculated per kg body weight of animal. Calculated amount of *churna* mg *churna* is suspended in 0.5% CMC.0.5 ml of suspensation was administered to animal.

Preparation of High Fat diet-
Composition of experimental diet (10ml/kg of animal weight in 2:3 Coconut oil :*Vanaspati ghee* proportion) was according to Standard protocol in research paper[9]

Animal Experiment:
Animal experiment was carried out at Animal house of Seth Govind Raghunath Sable's (SGRS) College of Pharmacy, Saswad

Ethics Committee Permission:
Study was carried out after Approval from institutional animal ethical committee taken at SGRS College of Pharmacy, Saswad.

Source of animals-
The 36 animal of healthy male Wister rats were provided by animal house of SGRS College of Pharmacy, Saswad

Animal Model: High Fat Diet Model.

Duration of Experiment: Experimental study carried out for 42 days

Grouping and coding-
Animals were randomly selected and marked with picric acid on head, body or tail of animal to give individual identification. Then animals kept in cages according to groups.

Protocol followed
The design of the study animal experimentation on Male Wister Rats weighing 180-200 gm was selected. Six groups of 6 animals each was made based on following pattern:

- Group I-Normal control (NC) - received normal diet and served as normal control. No treatment given to them.
- Group II-Disease control (DC)- received High Fat Diet throughout the study i.e. from 0 to 42 days.
- Group III-Standard control (SC)- received Atorvastatin 1.2 mg/kg/day from 22nd day to 42nd day, Along with High Fat Diet from 0 to 42nd Day.
- Test control 1- *Kurantaka churna* 1 (KC1)– received *Kurantaka patra* churn 90 mg/Kg, Along with High Fat Diet 0 to 42nd Day.
- Test control 2- *Kurantaka churna* 2 (KC2) - received *Kurantaka patra* churn 180 mg/Kg Along with High Fat Diet 0 to 42nd Day.
- Test control 3- *Kurantaka churna* 3(KC3) - received *Kurantaka patra* churn 270 mg/Kg Along with High Fat Diet from 0 to 42nd Day.
- Standard Drug, test drug were administered through Oral gavage daily once from 22nd to 42nd day.

Parameters
Weight of animals recorded every weekly throughout the experimental period i.e. on 0th, 7th, 14th, 21st, 28th, 34th, 42nd day. Blood samples taken from retro-orbital region on day 0, 21 and 42 for measurement of biochemical parameters (lipid profile and glucose). Animals sacrificed on 42nd and liver and adipo tissue collected from animals for histopathology studies

Abbreviations used for analysis-

NC-Normal control
DC-Disease control
SC –Standard control
KC1- *Kurantaka churna* 1- 90 mg/kg dose
KC2 – *Kurantaka churna* 2 - 180mg/kg dose
KC3 – *Kurantaka churna* 3- 270/kg mg dose

Statistical Study-

When observations are quantitative, ANOVA test applied for comparison between the Groups used. (If P-Value is less than 0.05, there is significant difference in the groups.)
For comparison between each of the pair, Post Hoc Analysis performed.
(there is significant difference between the pairs having P-Values less than 0.05 while there is no significant difference in the pairs for which P-Values greater than 0.05.)

Table 1; Effect of *Kurantaka churna* on Mean Change in Different parameters in HFD Induced Obesity (22^{nd} to 42^{nd}day)

Groups	Weight Mean ± SE	Total cholesterol Mean ± SE	Triglycerides Mean ± SE	HDl Mean ± SE	LDL Mean ± SE	VLDL Mean ± SE	BSL Mean ± SE
NC	8.7 ±1.67	-0.3±0.77	0.3±1.20	-0.4± 0.26	0.1 ± 0.88	0.1± 0.24	-0.2±1.11
DC	49.2±5.84	11.1±3.43	67.6±5.06	-1.0 ± 0.13	-1.4 ± 3.54	13.5 ±1.01	8.0±2.18
SC	-52.7±5.64	-44.8±3.37	12.6±2.07	2.5 ± 0.26	-49.8 ±3.60	2.5 ± 0.41	3.1±0.90
KC 1	-52.7±3.93	-36.3±1.63	26.2±4.29	2.4 ± 0.42	-43.9 ±1.76	5.2 ± 0.86	-8.6±2.03
KC 2	-45.2±2.68	-47.1±2.65	25.6±3.82	3.6 ± 0.56	-56.4 ±2.99	5.0 ± 0.76	-12.8±1.52
KC 3	-58.5±3.45	-59.8±2.79	24.3±2.07	4.8 ± 0.33	-69.5 ±2.97	4.9 ± 0.41	-14.3±3.37

Table 2: Effect of KC on HFD Induced Obesity on various parameters

Groups / Parameter	DC	KC1 (90mg/kg)	KC 2 (180mg/kg)	KC 3 (270mg)
Weight	KC 1 KC 2 KC 3 all doses showed Significant change in all biochemical parameters than DC	Same as SD	Same as SD	Same as SD
Total cholesterol		Same as SD	Same as SD	More effective than SD, KC 1 KC 2
Triglycerides		Same as SD	Same as SD	Same as SD
HDL		Same as SD	Same as SD	More effective than SD, KC 1
LDL		Same as SD	More effective than KC 1	More effective than SD, KC 1 KC 2
VLDL		Same as SD	Same as SD	Same as SD
BSL		All KC 1 ,2 ,3 Effective than SD		
Liver(Fat infiltration)	75%	50%	50%	25% Same as SD
Adipose tissue (Fat infiltration)	75%	50%	50%	25% Same as SD

Results-

After inducing obesity by giving High Fat diet for 21 days. From 22^{nd} to 42^{nd} day Test drugs were given and observations noted on 42^{nd} day.

All doses of *Kurantaka churna* showed Weight reduction and Significant change com-

pared to Disease control group. *Kurantaka churna* 90 mg dose and 180 mg dose acts same as Standard drug. Effect of 90mg/kg and 180 mg/kg found same as standard drug except in Histopathogical changes.

Although 180mg/kg is an ideal dose (as per calculation for rats) according to ancient text but it only shows more effective on BSL parameter than standard drug. In other parameters like Weight, Lipid profile, affect same as Standard drug is found whereas in Histopatholgical studies it is less effective than Standard drug. This finding may be because of continued *hetu sevaan* by rats in form of High Fat Diet along with medication. According to *Ayurveda*, avoiding cause responsible for disease (*Nidan parivarjana)* is also very important aspect of treatment. So if the *Nidan parivarjana* is done then calculated for rats i.e. 180mg /kg may be more effective.

On the other hand *Kurantaka churna* 270mg/kg dose showed more effect than standard drug on Total cholesterol, HDL, LDL and in BSL as well. And it showed same effect as Standard drug on Weight reduction and Liver histopathological results

By analyzing this results, it can be noted that *Kurantaka churna* 90mg/kg, 180mg/kg and 270mg/kg all three doses shows anti obesity action on High fat Diet Induced obesity.

All doses of *Kurantaka churna* (90/kg,180/kg,270mg/kg) doses reduces BSL significantly and supports previously reports Anti diabetic activity of *Barleria prionitis* leaf extracts.

CONCLUSION

Based on all the results of study and discussion, it can be concluded that *Kurantaka leaf churna* (*Barleria prionitis Linn*) exhibit Anti-obesity activity in experimental model of High Fat Diet induced obesity. Among three doses (90 mg/kg, 180mg/kg, 270mg/kg) ,

Kurantaka churna with 270mg/kg showed better results.

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