Research Article

Comparative study of efficacy of Ayurvedic Appetizer formulations in experimental animals

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ABSTRACT

Digestants are group of herbs that remove food stagnation and improve digestion. They are mainly indicated for abdominal distension, indigestion and poor appetite as well as belching, acid regurgitation, nausea and vomiting. Most of these herbs contain lipase, amylase and vitamin B. Pharmacologically these drugs have digestant effects.Liv-52 was introduced in 1955 by Himalaya Herbal Healthcare. Liv-52 restores the functional efficiency of the Liver by protecting the hepatic parenchyma and promoting hepatocellular regeneration. Livomyn is a Charak pharma ayurvedic product for stimulating Liver functions as well as to correct any Liver pathlogy. It helps in conditions such as hepatitis, cirrhosis, and jaundice due to multiple causes. The effects of different ayurvedic appetizer formulations in experimental animals was studied and found that The amount of food eaten by the animals in each group (as per day average) was noted down and thus an increase in appetite was calculated. The results of standard and test drugs were comparable. Besides studying the increase in appetite by calculating the amount of food intake in 24 hours, another observation was made in which the amount of food eaten by each animal individually in 6 hours after dosing was reported. The mice were kept in individual separate cages for 6 hours post dosing and provided with pre-weighed amount of food Thus percentage increase in food intake was calculated and subjected to statistical analysis which revealed a statistically significant difference between test drug groups and control. The results of standard and test groups were comparable.

Keywords: Digestant, Herbs, Hepatocellular, appetite.

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INTRODUCTION

Digestants are group of herbs that remove food stagnation and improve digestion. They are mainly indicated for abdominal distension, indigestion and poor appetite as well as belching, acid regurgitation, nausea and vomiting. Most of these herbs contain lipase, amylase and vitamin B. Pharmacologically these drugs have digestant effects.[1]

LIV 52

Liv-52 was introduced in 1955 by Himalaya Herbal Healthcare. Liv-52 restores the functional efficiency of the Liver by protecting the hepatic parenchyma and promoting hepatocellular regeneration. The antiperoxidative activity of Liv-52 prevents the loss of functional integrity of the cell membrane, maintains cytochrome P-450, hastens the recovery period and ensures early restoration of hepatic functions in infective hepatitis. Liv-52 facilitates rapid elimination of acetaldehyde, the toxic intermediate metabolite of alcohol metabolism, and ensures protection from alcohol-induced hepatic damage. Liv-52 diminishes the lipotropic activity in chronic alcoholism, and prevents fatty infiltration of the Liver. In pre-cirrhotic conditions, Liv-52 arrests the progress of the disease and prevents further Liver damage.[2,3, 6]

Livomyn [5]

Livomyn is a Charak pharma ayurvedic product for stimulating Liver functions as well as to correct any Liver pathlogy. It helps in conditions such as hepatitis, cirrhosis, and jaundice due to multiple causes. It is an excellent general Liver restorative and also acts as a digestive.

Allopathic drug (Pancrelipase)
Pancrelipase is used to help digestion in certain conditions in which the pancreas is not working properly. It may also be used for other conditions as determined by your doctor. Pancrelipase contains the enzymes needed for the digestion of proteins, starches, and fats. [4]

EXPERIMENTAL PART
Sixteen healthy swiss albino mice are selected and divided into four groups: control, standard reference, test drug 1 and test drug 2. The mice were kept at 28 ± 2°C temperature and were allowed to have their normal food and water. Control group mice are given no treatment while standard group given allopathic standard drug. Test group 1 and test group 2 are given Liv 52 and Livomyn respectively. This treatment schedule is followed for a period of 4 weeks.

During this period the animals were evaluated for the increase in food intake, the increase in weight and change in behavior pattern. Increase in food intake is calculated by subtracting the amount of food placed in the cage with the amount of food left in a particular time interval. The animals are weighed each day and thus change in the weight can be calculated.

A total of 24 albino wistar mice were taken in the study. These were divided into four groups viz. control, standard, test 1 and test 2. There were six mice in each group. The study was planned for a period of five weeks (Week 0, the start week to week 5, the end week). One mouse each in standard and control group died prior to the commencement of the study due to one or other reason (one possible reason may be due to extreme hot weather).

WEIGHT DISTRIBUTION OF ANIMALS
Most of the mice taken in the study were in the weight range of 20-30 grams at the start of study.

Table 1: Weight distribution of study animals

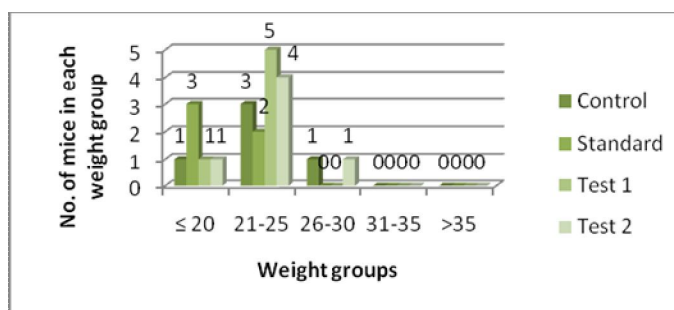| GROUP	Animal Groups (No. of mice)				TOTAL
	Control	Standard	Test 1	Test 2	
≤ 20	1	3	1	1	6
21-25	3	2	5	4	14
26-30	1	0	0	1	2
31-35	0	0	0	0	0
>35	0	0	0	0	0

Fig. 1: Comparative weight distribution of mice

Table 2: Individual weight distribution of animals

Treatment groups		Weight in gram
Control	1	20
	2	25
	3	25
	4	30
	5	25
Mean ± SEM		25.00 ± 1.58
Standard	1	25
	2	20
	3	20
	4	20
	5	25
Mean ± SEM		22.00 ± 1.23
Test 1	1	20
	2	25
	3	25
	4	25
	5	25
	6	25
Mean ± SEM		24.17 ± 0.83
Test 2	1	25
	2	20
	3	30
	4	25
	5	25
	6	25
Mean ± SEM		25.00 ± 1.29

EVALUATION PARAMETERS
Increase in weight of animals after different treatments
Increase in amount of food intake of animals
Study of behavior pattern

Study of various biochemical tests performed
The animals were administered with the study medication once daily. The animals were provided with the pre-weighed food in the morning and amount of food left in the cage the next day was noted down for each animal. Also the food intake of individual animal was observed by keeping the individual animal in an isolated cage for 6 hours.

**INCREASES IN WEIGHT OF ANIMALS AFTER DIFFERENT TREATMENTS**
This efficacy parameter is a comparison among the control, test drugs and standard drug groups with respect to increase or decrease in weight of study animals after the administration of study drugs. The weight of each animal was recorded on per day basis and results were reported on per week basis (Table).Thus a comparison of change in weight of animals among different groups was obtained (Figure). A significant increase was observed in standard drug group, 24.1% when compared to Test 1 (19.3%) and Test 2 treatment group 21.1% increment.

Table 3: Individual weight distribution of animals across five weeks

Treatment groups		Weight in grams				
		Week 1	Week 2	Week 3	Week 4	Week 5
Control	1	20	20	20	25	25
	2	25	25	25	25	25
	3	25	25	25	25	25
	4	30	30	30	30	30
	5	25	25	25	25	25
Mean ± SEM		25.0 ± 1.6	25.0 ± 1.6	25.0 ± 1.6	26.0 ±1.0	26.0 ± 1.0
Standard	1	25	30	35	35	35
	2	20	25	25	30	30
	3	20	25	25	25	25
	4	20	25	25	25	25
	5	25	25	30	30	30
Mean ± SEM		22.0 ± 1.2	26.0 ± 1.0	28.0 ± 2.0	29.0 ± 1.9	29.0 ± 1.9
Test 1	1	20	25	25	25	30
	2	25	25	25	25	25
	3	25	25	25	25	30
	4	25	25	30	30	30
	5	25	25	30	35	35
	6	25	30	30	30	30
Mean ± SEM		24.2 ± 0.8	25.8 ± 0.8	27.5 ± 1.1	28.3 ± 1.7	30.0 ± 1.3
Test 2	1	25	30	30	30	30
	2	20	25	25	30	30
	3	30	30	35	35	35
	4	25	30	30	30	30
	5	25	25	30	30	35
	6	25	25	25	30	30
Mean ± SEM		25.0 ± 1.3	27.5 ± 1.1	29.2 ± 1.5	30.8 ± 0.8	31.7 ± 1.1

Table 4: Increase in weight of animals across five weeks

	Average weight of animals from week 1 to week 5					% Increase
	Week 1	Week 2	Week 3	Week 4	Week 5	
Control	25.0	25.0	25.0	26.0	26.0	3.8
Standard	22.0	26.0	28.0	29.0	29.0	24.1
Test 1	24.2	25.8	27.5	28.3	30.0	19.3
Test 2	25.0	27.5	29.2	30.8	31.7	21.1
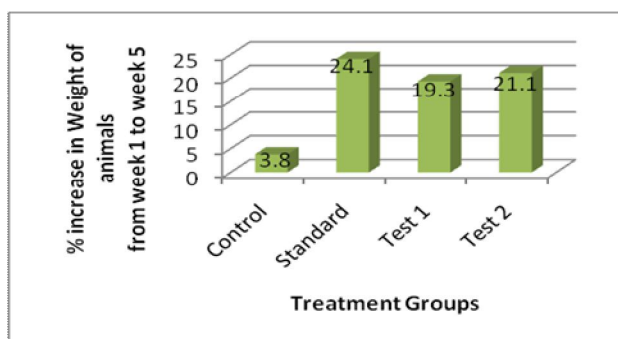
Fig. 2: Percentage increase in weight of animals

Table 5: Statistical comparison of Test drug groups with control and Standard for percentage increase in weight of animals

Statistical Parameters	Groups considered for statistical analysis			
	Test 1 vs Standard	Test 2 vs Standard	Test 1 vs Control	Test 2 vs Control
Test applied	Unpaired t test	Unpaired t test	Unpaired t test	Unpaired t test
P Value	0.4164	0.5686	0.0468	0.0084
Significance (p<0.05)	No	No	Yes	Yes

Increases in Amount of Food Intake of Animals

The amount of food eaten by the animals in each group (as per day average) was noted down and thus an increase in appetite was calculated. The results of standard and test drugs were comparable.

Table 6: Percentage increase in food intake (per day) in four treatment groups

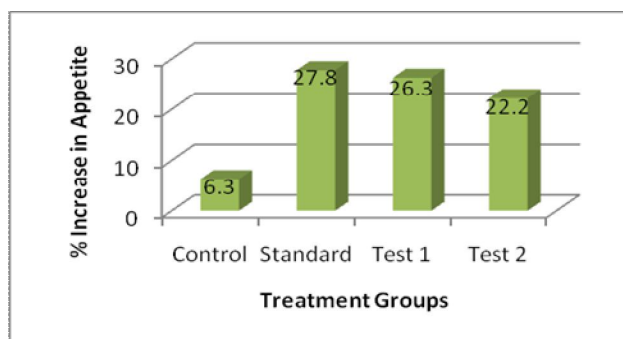| Group	Average per day food intake of animals from week 1 to week 5 (gms)					% Increase
	Week 1	Week 2	Week 3	Week 4	Week 5	
Control	75.0	80.0	80.0	80.0	80.0	6.3
Standard	65.0	75.0	80.0	85.0	90.0	27.8
Test 1	70.0	80.0	85.0	90.0	95.0	26.3
Test 2	70.0	75.0	80.0	85.0	90.0	22.2

Fig. 3: Percentage increase in food intake (per day) in four treatment group

Besides studying the increase in appetite by calculating the amount of food intake in 24 hours, another observation was made in which the amount of food eaten by each animal individually in 6 hours after dosing was reported (Table 7 ,fig 9) The mice were kept in individual separate cages for 6 hours post dosing and provided with pre-weighed amount of food. Thus percentage increase in food intake was calculated and subjected to statistical analysis which revealed a statistically significant difference between test drug groups and control. The results of standard and test groups were comparable.

Table 7: Food intake of animals individually in 6 hours post dosing

Treatment groups		Amount of food eaten in 6 hrs after dosing (gms) (Average per day from week 1 to week 5)				
		Week 1	Week 2	Week 3	Week 4	Week 5
Control	1	4.1	4.2	4.4	4.3	4.4
	2	4.8	4.9	4.5	5.0	5.1
	3	4.5	4.6	4.7	4.7	4.7
	4	5.0	5.0	5.3	5.3	5.3
	5	4.0	4.3	4.4	4.5	4.5
Mean ± SEM		4.5 ± 0.9	4.6 ± 0.2	4.7 ± 0.2	4.8 ± 0.2	4.8 ± 0.2
Standard	1	3.8	4.2	4.4	4.7	4.9
	2	3.6	3.9	4.3	4.8	4.8
	3	3.8	4.1	4.3	4.7	4.8
	4	4.0	4.6	4.8	4.9	5.1
	5	3.5	4.0	4.4	4.6	4.7
Mean ± SEM		3.7 ± 0.1	4.2 ± 0.1	4.4 ± 0.1	4.7 ± 0.1	4.9 ± 0.1
Test 1	1	3.9	4.1	4.4	4.7	5.0
	2	3.8	3.8	4.3	4.5	4.6
	3	4.0	4.4	4.6	5.0	5.2
	4	3.5	3.8	4.0	4.2	4.3
	5	4.0	4.2	4.5	4.8	5.0
	6	4.0	4.3	4.4	4.9	5.2
Mean ± SEM		3.8 ± 0.1	4.1 ± 0.1	4.4 ± 0.1	4.7 ± 0.1	4.9 ± 0.2
Test 2	1	4.2	4.5	4.8	4.7	5.0
	2	3.6	4.0	4.4	4.8	4.9
	3	4.0	4.3	4.5	4.6	4.8
	4	4.1	4.4	4.3	4.7	4.9
	5	3.9	4.5	4.7	4.9	5.1
	6	4.0	4.4	4.4	4.9	5.0
Mean ± SEM		4.0 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	4.8 ± 0.1	5.0 ± 0.1

Table 8: Increase in food intake of mice in a period of six hours post dosing

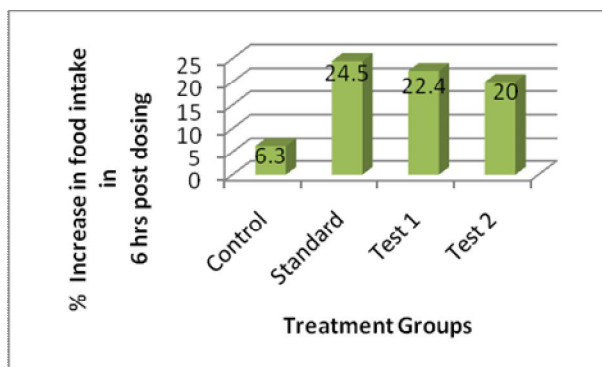|	Amount of food eaten in 6 hrs after dosing (gms) (Average per day from week 1 to week 5)					% Increase
	Week 1	Week 2	Week 3	Week 4	Week 5	
Control	4.5	4.6	4.7	4.8	4.8	6.3
Standard	3.7	4.2	4.4	4.7	4.9	24.5
Test 1	3.8	4.1	4.4	4.7	4.9	22.4
Test 2	4.0	4.4	4.5	4.8	5.0	20.0

Fig. 4: Comparative percentage increase in appetite in 6 hours after administration of medication

Table 9: Statistical comparison of Test drug groups with control and Standard for percentage increase in food intake in 6 hrs after dosing

Statistical Parameters	Groups considered for statistical analysis			
	Test 1 vs Standard	Test 2 vs Standard	Test 1 vs Control	Test 2 vs Control
Test applied	Unpaired t test	Unpaired t test	Unpaired t test	Unpaired t test
P Value	0.1170	0.1632	0.0001	0.0002
Significance (p<0.05)	No	No	Yes	Yes

STUDY OF BEHAVIOR PATTERN

The animals were observed for a period of 10-20 min post dosing 2-3 times daily and various behavior activities were studied (Table 10).

Table 10: Study of Behavior Pattern

Behavior parameter	Treatment groups (No. of Animals)			
	Control	Standard	Test 1	Test 2
Deceased motor activity	1	0	0	0
Decreased grooming activity	1	0	0	0
Decreased alertness	0	0	0	0
Aggressiveness	0	2	1	1

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