



Research Article

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A COMPARATIVE STUDY OF THE EXUDATES OF NADEE HINGU AND HINGU WITH SPECIAL REFERENCE TO THEIR EFFECT ON GASTRO INTESTINAL MOTILITY BY CHARCOAL MEAL TEST IN ALBINO MICE

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ABSTRACT

The properties and actions of Hingu (*Ferula asafoetida*) and Nadeehingu (*Gardenia gummifera*) are found to be similar and quoted as Hingudwayam in the text Raja nighantu, pippalyadi varga. Hingu is an exotic material for which the source plant is available in limited geographical area of Asia Minor where as Nadee hingu is indigenous and the source plant is abundant especially in Southern India. Hence to check whether hingu can be substituted by nadeehingu, it was planned to study and compare their pharmacological activity. Both exudates are referred for their Vatanulomana (carminative), vibandhahar (relieving constipation) and anaha hara (anti flatulent) actions. The present study was intended to compare the effect of two drugs on intestinal motility using charcoal meal test through *in vivo* experimental model in mice. Study showed the maximum transit in hingu group followed by original sample of nadee hingu denoting their functional symmetry. By the results obtained during charcoal meal test it can be assumed that Hingu can be substituted by Nadeehingu for its actions in gastro intestinal tract.

Keywords: hingu, nadeehingu, symmetry, intestinal motility, charcoal meal test

INTRODUCTION

Nadee hingu i.e. *Gardenia gummifera* belonging to Rubiaceae family¹ is a bushy shrub found abundantly in hilly regions of Southern parts of India. The leaf buds and the young shoots of nadi hingu yield a resinous exudation, known in commerce as dikamali or cumbi gum². It is yellow in color and found on incisions on young branches and breaking points of leaves³. The resin is secreted freely or naturally in the form of tears. The resin is transparent, greenish yellow, with a sharp pungent taste and a peculiar offensive odor. Gum occurs in amalgamated pieces drying in air⁴. The exudate smells strongly as similar to asafoetida with similar qualities and actions hence the name Nadee hingu⁵. Hingu is an oleo gum resin obtained from the root of *Ferula asafoetida* a large umbelliferous⁶ plant growing in eastern Persia and western Afghanistan. In the cortex of the stem and also in the root, there are numerous large, schizogenous ducts filled with a whitish, gum resinous emulsion called asafoetida⁷. In trade asafoetida occurs in three forms tear, paste and mass⁸. They are of dull yellow or sometimes grayish colour, darkens on keeping finally becoming reddish brown. The drug has an intense, penetrating, persistent, alliaceous odour and a bitter, acrid, alliaceous taste⁹. In purview of the symmetry in properties and actions of Hingu and Nadee hingu¹⁰, it was planned to study and compare their pharmacological effects and to check whether Hingu which is imported from Afghanistan and other countries, can be substituted by Nadee hingu which is indigenous and abundant in South India. Both exudates are referred for their Vatanulomana (carminative), vibandhahar

(relieving constipation) and anaha har (anti flatulent) actions¹¹. In the present study it was planned to compare the effect of two drugs on intestinal motility using charcoal meal test by *in vivo* experimental model in mice.

Objectives of the Study

- Comparison of Hingu and Nadeehingu with special focus on symmetry in their properties and actions.
- Experimental evaluation of their effect on gastrointestinal motility by charcoal meal test in albino mice.

MATERIALS AND METHODS

Charcoal Meal Test Requirements

Albino mice of either sex weighing 30 to 40 g; Number of animals- 24

Top pan weighing balance, electronic digital weighing balance, mortar and pestle, picric acid stain, trial samples, charcoal, distilled water, feeding tube, syringe, sterilizer, scalpel blade, scissor, toothed forceps, cotton thread, iodine tincture and cotton.¹²

Preparation of drug

The resinous gum exudate was collected from leaf buds of *Gardenia gummifera* plant in Udipi, India and dried in shade powdered and triturated with water to get yellow color suspension. The market sample of nadee hingu

procured from Bangalore, India market and triturated with distilled water. The sample of hingu collected from S.D.M. Pharmacy, Udupi, India and triturated with water to get milky white suspension.

Dose fixation

Animal dose calculated on the basis of human dose (500 mg) by using standard conversion formula i.e. human dose $\times 0.0026 \times 50 / \text{kg body wt.}$

Route of administration of drug: Oral

Procedure

The charcoal meal test was carried out at pharmacology laboratory of SDM Center for Research in Ayurveda and allied sciences, Udupi, India after getting approval from Institutional Animal Ethical Committee (IAEC approval No. SDMCAU / ACA 15/EC 02). Twenty four albino mice of either sex weighing 30 to 40 g are divided into four groups (A-D) of six animals each. Animals were starved for 14 h but provided with drinking water *ad libitum*. Group A received distilled water (10 ml /kg) and marked as control group. Group B animals received aqueous suspension of original nadihingu sample (70 mg/kg) while Group C animals received aqueous suspension of nadihingu market sample (70 mg/kg). The animals of group D were treated with aqueous suspension of Hingu (70 mg/kg) and taken as standard group. The animals were fed with respective drugs orally using feeding tube. After one hour of respective drug administration the animals of all the 4 groups were administered with 0.2 ml of charcoal meal (10 % charcoal in 5 % gum acacia suspension). After 20 minutes of charcoal meal administration each animal was sacrificed by cervical dislocation and abdomen was dissected to separate the total length of the intestine. The distance travelled by charcoal meal from pylorus to caecum was measured using cotton thread. The % of distance travelled by charcoal meal in ratio to intestinal length and % change between groups was calculated by using following formula.

$$\text{Percentage travelled} = \frac{\text{Distance travelled by charcoal meal} \times 100}{\text{Total length of small intestine}}$$

Statistical analysis

The percentage intestinal transit observed in different groups were presented as mean \pm S.E.M. and analyzed for statistical significance using one way ANOVA followed by Dunnet's t test as post hoc test; the 'P' value lesser than 0.05 was considered significant. Computer stat software package Sigma stat version 3.5 was used for analysis.

OBSERVATIONS AND RESULTS

The features, constituents, properties and actions of both the exudates were reviewed and depicted in Table 1 and 2

The effect of two samples of nadee hingu along with hingu on gastrointestinal motility tested using charcoal meal experimental model and the mean values of total intestinal length, the distance travelled by the charcoal and the percentage transit noticed in four groups were tabulated (Table 3 and 4 and Figure 1). The differences in the mean values among the treatment groups were greater than expected by chance; there is a statistically significant difference ($P = < 0.001$). The intestinal transit was maximum in hingu followed by original and market samples of nadee hingu which are statistically significant $P < 0.050$.

DISCUSSION

As per the literature available on these two niryasa dravyas, much symmetry was observed specifically in properties and actions. Both are having katu rasa, katu vipaka, Ushna, Teekshna guna and perform deepana, pachana, anulomana and vibandhahara actions. Pandit Narahari in his Raja Nighantu mentioned the symmetry of these two exudates¹⁰. The original sample was found as transparent, shiny yellow rounded / ovoid tears, with a sharp pungent taste and a peculiar offensive strong odor. It was free from impurities and powdered on pounding. The market sample procured from Bangalore, India occurred as irregular smaller pieces gummy sticky mass with glistening green yellow color. It was found mixed with stem pieces and remnants of other plant parts. Odour was characteristic strong persistent and taste bitter pungent. The sample of hingu was rounded ovoid tears with reddish brown color and strong penetrating alliaceous odor. On trituration with water it gave clear milky suspension with no precipitate at the bottom which was acrid pungent taste. In purview of the symmetry in properties and actions of Hingu and Nadee hingu (Table 1), present study was conducted with an intention to compare their pharmacological effect with special reference to their effect on peristaltic movement by *in-vivo* method using charcoal meal test and to check whether hingu can be substituted by nadee hingu. Gastrointestinal motility was assessed by calculating the percentage of distance traveled by charcoal meal through small intestine after administration of drugs. The total length of the intestine, distance travelled by charcoal and the percentage observed in different groups were compared. On reviewing the intestinal transit in different groups it can be assumed that hingu is the best vatanulomana and vibandhahara dravya as it has shown 61 % motility while the exudates of nadee hingu also exerted 57.9 % of remarkable intestinal transit which is near to that of hingu. However the market sample of nadee hingu showed comparatively lesser change (53.2 %) in charcoal movement within the intestine when compared to other groups and this could be probably due to other admixtures found as impurities in the market sample.

Table 1: Comparison of Nadee hingu with Hingu

Features	Hingu (<i>Ferula asafetida</i>)	Nadee hingu (<i>Gardenia gummifera</i>)
1 Habit habitat	Large shrub / small tree Afghanistan, Persia, Baluchistan,	Large shrub/ small tree occurring in hilly regions chiefly south India
2 features	oleo-gum-resin from root and stem base ; yellowish white changing to reddish brown, tears or masses, rounded or flattened, tears-0.5-3 cm diameter ,intense persistent, penetrating alliaceous odour, acrid bitter taste.	Gum resin exuding from leaf bud, leaf and young stem branches; yellow to yellowish green irregular pieces with strong persistent odour resembling Hingu
3 constituents	resin, 40-65; gum,20-25; V.oil, 4-20; Coumarin, di and trisulphides, asaresinetol, asafetidin. with H ₂ SO ₄ -red or reddish brown, with HNO ₃ - green in H ₂ O –milky white emulsion.	Resin 89.9 %, vol oil 0.1 % others 10 % Gardenin, saponin, iodine, acids.
4 Properties	Laghu, snigdha, teekshna ; katu rasa, ushna veerya, katu vipaka, Kapha vatahara, pittakopaka	Laghu, ruksha, teekshna; katutikta; Ushna veerya, katu vipaka, kaphavatahara
5 Actions	Rochana, deepana, pachana, vatanulomana anaha,adhmana,shulahara, vibandhahara, gulmahara, ajeernahara, raja pravartaka, krimighna, arshoghna, bastishulahara, kasahara, swasahara. Carminative, stimulant, anti spasmodic, anti microbial.	Deepana, pachana, lekhana, vatanulomana, shula prashamana, kapha nissaraka, swasahara, kasahara, krimighna, jwaraghna, kushthagna, Appetizer, Carminative, stomachic, digestive, antispasmodic, antiseptic

Table 2: Features of two samples of nadee hingu and Hingu

Features	Nadeehingu 1 (original)	Nadeehingu 2 (market sample)	Hingu
Appearance	Rounded / ovoid tears, powdered on pounding	Irregular smaller pieces gummy, sticky mass, glistening	Rounded / ovoid tear shape, sticky, glistening oily appearance
Impurities	Absent	Traces	Absent
Color	Shiny yellow	Yellowish brown	Reddish brown
Aqueous suspension	Yellowish	Brownish yellow	Milky white
Odor	Agreeable strong	Agreeable strong	Strong, penetrating alliaceous
Taste	Bitter pungent	Bitter acid	Pungent acid

Table 3: Comparison of Intestinal motility in different groups

S. No	Group	Total length Intestine cm	Charcoal movement in cm	% transit
1	Control	45.17	22.4	49.60
2	Nadee hing original	45.45	26.28	57.91
3	Nadee hingu market	43.85	23.37	53.26
4	Hingu	44.25	27	61.03

Table 4: Analysis of Percentage transit in intestine

Group Name	N	Mean	Std Dev	SEM
A	6	49.596	1.306	0.533
B	6	57.905	2.849	1.163
C	6	53.262	2.154	0.879
D	6	61.028	0.828	0.338

Group A negative control; group B nadee hingu niryasa; group C – nadee hingu market sample; group D- Hingu

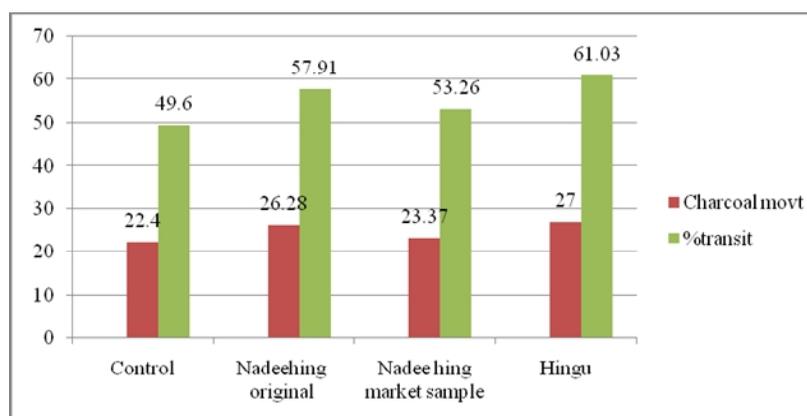


Figure 1: Effect of nadee hingu and hingu on G. I. motility

CONCLUSION

The exudates of Nadeehingu and Hingu were found to have many similarities especially in properties and actions. The charcoal meal test conducted in animal model to assess the effect of hingu and nadee hingu on intestinal motility, showed the maximum transit in hingu group followed by original sample of nadee hingu denoting their functional symmetry. But market sample of nadee hingu showed lesser increase in motility when compared to other samples and this could be because of other admixtures found as impurities in the market sample. The present study is a stepping stone and if other investigations also show similar results then Hingu may be substituted by Nadeehingu for its actions in gastro intestinal tract.

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