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Systemic effect of *Tephrosiapurpurea (Sarapunkha)* on G.I.T -An Experimental Study

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Tephrosia purpurea is one of the important drug in Ayurvedic system of medicine extensively used as antipyretic and in diseases of liver,spleen and heart.Recently it has attracted the attention of the scientists all over the world for its hepato-protective and stimulant activity (MAPA, 2001). Two varieties are described in Ayurvedic texts as rakta and sweta. An attempt was made to see g influence of drug on gastro intestinal tract motility in the experimental animals..In group II (drug treated), Tephrosia purpurea Root powder decoction of Tephrosia purpurea was fed by intra gastric route in known doses (0.5 mg/gm body weight) every morning for 21 days. The control group animals were given water only (equal volume of tap water). Food intake, water intake and weight of rats in control as well as in drug treated group were measured. For the assessment of gut motility of rat, microbar powder suspension administered (a palatable micronized BaSO4 92% w/v from ESKAY fine chemicals) and fasted for 12-14 hours. After 30 minutes of the administration of microbar suspension all the rats were sacrificed simultaneously and measured the BaSO4 powder traveled distance fixed amount of microbar solution. Tephrosiapurpurea enhances intestinal motility in albino rats. Histopathologicalstudy of liver, spleen, and kidney, intestine revealed that Tephrosiapurpurea have no toxic effect.

Introduction

Ayurveda,has much wider aims and objectives i.e maintenance of physical, mental, spiritual and social well being of the individual. *Ayurveda* primarily involves the use of the products of plant origin, may include the roots, shoots, leaves, flowers andseeds, either individually or in combination from single plant or from plants of different species and genera in different proportions.Tephrosia purpurea is one of the important drug in Ayurvedic system of medicine. The roots, leaves, seeds and whole plant of Tephrosia purpurea are extensively used as antipyretic and in diseases of liver, spleen and heart.

Concept of gastrointestinal tract in Ayurveda-

Concept of gastrointestinal tract is very much elaborated by the *AyurvedicSamhitas.*The gastrointestinal tract is described by various terms like *Mahasrotas*, *Annavahasrotas* and *Kostha* etc. *Sushruta has* explained that *Amasaya* is the most important part of the alimentary tract whereas *Caraka* has included both stomach and small intestine in it.

Drug Review-

Tephrosia purpurea(*Sarapunkha*)-The *Sanskrit* word *Sarapunkha* generally means *Sara*, an arrow and *punkha*, the wings;i.e, if both the ends of its leaf are held and pulled, edges like that of an arrow are formed. It is also called *plihashatru*, meaning an enemy of the spleen (splenic diseases).*Sarapunkha* is generally used in splenic diseases, tumors, enlargement of liver and spleen, diabetes and skin diseases. Recently it has attracted the attention of the scientists all over the world, for its hepato-protective and stimulant activity *(MAPA, 2001).*Two varieties are described in Ayurvedic texts as rakta and sweta.

Botanical Name:	*Tephrosia purpurea* (Linn.) Perse
Family:	*Leguminoseae* (*Papilionateae*)
Synonyms:	*Pleehashatru*, *Neelvrikshakriti*
English Name:	Wild Indigo, Purple Tephrosia
Hindi:	Sarponkha

Parts used- *Root,Panchanga* especially, *Panchanga-kshara*

Chemical Constituents-Roots contain tephrosin, dengulin,quercetin,isotephrosin and rotenone. In the roots and leaves 2.5% rutin is found. A new β-hydroxychalcopurpurnone,Isolonchocarpin, pongamol, Lanceolatin A, Lanceolatin B, Karanjin, Kanjone and β-sitosterolis isolated from roots (Phytochemistry, 1979, 1984)

Materials and Method-

Experimental Study-Total 12 albino rats were selected for gastrointestinal tract study and divided into two groups. Each group comprised of 6 albino healthy rats of Charles Foster strain (weighing 160 gm – 200 gms). The rats were kept under standard laboratory conditions (Temperature 27±2°C related humidity of 65%, 12 hours light and dark cycle). They were fed with standard rat food (Hindustan Lever India, rat pellets) and water adlibitum.-Group I (control), andGroup II (drug treated).

Method of Drug preparation-

Tephrosia purpurea was collected in the months of August–October. Roots were separated from the rest of the plants and washed thoroughly and dried in shade for 7-10 days. After drying, fine grinding of root was done. For the preparation of decoction of drug, 6 gm of root powder was taken and 100 ml. of water was added to it in a beaker. The contents were heated on a slow flame and shifted off and on for proper fixing. The procedure of heating and boiling the mixture was continued till solvent was reduced to 25% of its original volume. The mixture was filtered through a sieve with pore size No.1/120. The total time taken in boiling the mixture was around 30-40 minutes.

Dose schedule for Albino Rats -Root powder decoction of *Tephrosia purpurea* was fed by intra gastric route in known doses (0.5 mg/gm body weight) every morning for 21 days.

Measurement of Food intake, Water Intake and Weight of Rats-

Food intake, water intake and weight of rats in control as well as in drug treated group were measured. In group II (drug treated), *Tephrosia purpurea* root powder decoction was fed by intra gastric route in known doses (0.5 mg/gm body weight) every morning for 21 days. The control group animals were given water only (equal volume of tap water). During this period, both group rats were given rat-diet and water adlibitum. The diet, water consumption and the change in weight of rats were recorded.

Method of Study for gut motility-For the assessment of gut motility of rat, microbar powder suspension administered (a palatable micronized $BaSO_4$ 92% w/v from ESKAY fine chemicals). The rats were fasted for 12-14 hours. After 30 minutes of the administration of microbar suspension, the rats of both groups were sacrificed simultaneously and measured the $BaSO_4$ powder traveled distance in ½ hour at fixed amount of microbar solution. The intestine was measured from starting of first part of duodenum to the ileocecal junction by naked eye examination.

Histopathological study of liver, spleen, kidney and intestine was performed after completion of experimental study and slides were stained through Hemtoxyline and Eosin (H&E) staining and permanent slides were made. Total serum bilirubin level was investigated in both the groups of albino rats.

Observations and Result-

Water intake-Water intake was found increased in group II in comparison to group I (control). Water intake varied from 32.08±6.92 to 37.23±5.20 in group II while in group I (control group) it was found 26.33±4.86 to 35.58±7.05. On intergroup comparison water intake was found highly significant on 1^{st}, 5^{th}, 12^{th}, 13^{th}, 14^{th}, and 21^{st} day and significant in 2^{nd} week and mean differences of water intake from 1^{st} to 21^{st} day were found statistically highly significant (t-9.23, $p<0.001$) which is evident from Table No. 01.

Food intake-Food intake (gm/day) slightly increased during 21 days in drug treated group. Statistically ,it was found highly significant initially then significant whereas after 2^{nd} week of study it was found highly

significant.On intergoup comparison the mean differences of food intake from 1st to 21st days were found highly significant(t=18.93,p<0.001) (Table No.01).

Weight-Weight of rats was not significantly altered in control as well as drug treated groups as shown in

.**Table No. 1: Effect of *Tephrosia purpurea* on water intake, food intake and weightof Albino Rats.**

Total intestinal length-

	Mean±S.D. **Day 1 to Day 21**		**Inter-Group Comparison**	
	Group I (Control)	**Group II (Drug Treated)**	**t-value**	**p-value**
Water Intake (ml/day)	28.23 ± 2.11	33.36 ± 1.43	t = 9.23	p < 0.001 *HS*
Diet Intake (gm/day)	17.81 ± 1.34	21.10 ± 1.50	t = 18.93	p < 0.001 *HS*
Weight (gm/day)	183.02 ± 5.53	182.34 ± 5.58	t = 0.83	p > 0.05 *NS*

Mean ± S.D. of intestinal length in group I and group II was found 73.83±4.75 and 73.17±4.54, respectively. To assess the intestinal motility, the distance traveled by $BaSO_4$ solution was found more in drug treated group (Group I) in comparison to control group (Group I). Mean±S.D. was 61.50±3.38 in group I while 64.00±4.05 in group II. When inter group comparison was performed by unpaired 't' test it was not found significant (t=1.10 p>0.05) (Table No.02).

Table No. 2: Effect of *Tephrosia purpurea* root powder decoction on intestinal motility (duodenum to ileocecal junction) in Albino Rats by using microbar solution.

Number of Rats	**Total length (cm)**		**$BaSO_4$ Travel (cm)**	
	Control group	**Drug Treated group**	**Control group**	**Drug Treated group**
1	72.0	77.0	60.0	68.0
2	82.0	68.0	62.0	59.0

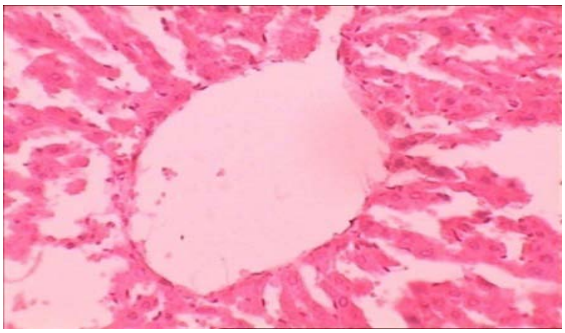
3	74.0	70.0	68.0	64.0
4	76.0	73.0	63.0	64.0
5	70.0	80.0	59.0	69.0
6	69.0	71.0	57.0	60.0
Mean± S.D.	**73.83±4.75**	**73.17±4.54**	**61.50±3.83**	**64.00±4.05**
Intergroup comparison unpaired t-test	**t = 0.25** **p>0.05 *NS***		**t = 1.10** **p>0.05 *NS***	

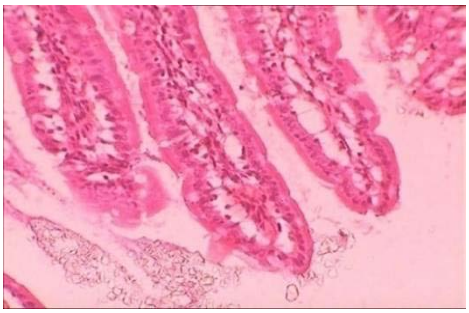
Serum Bilirubin (mg%)-Mean serum bilirubin level was found 18.68±5.34 and 13.00±1.31 in group I and group II respectively. Decrease in serum bilirubin was observed in group II as compared to group I. Statistical analysis of group I vs group II revealed significant decrease in serum bilirubin.

Table No. 03: Showing the level of S. Bilirubin in control and Drug Treated group of Albino Rats after intragastric administration of *Tephrosia purpurea* root powder decoction.

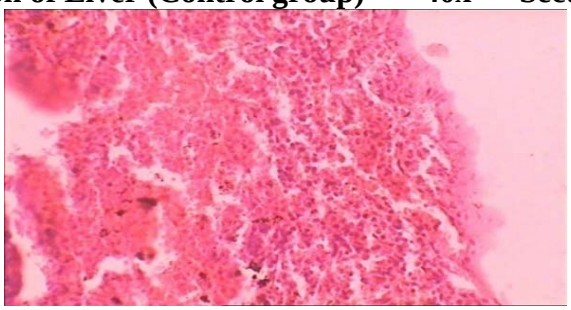
Number of Rats	**S. Bilirubin (mg %)**	
	Control group	**Drug Treated group**
1	17.5	12.9
2	16.3	11.4
3	29.1	12.0
4	19.1	13.4
5	15.6	15.2
6	14.5	13.1
Mean ± S.D.	**18.68 ± 5.34**	**13.00 ± 1.31**
Inter-group Comparison Unpaired t-test an p-value	**t = 2.53 p<0.05 *S***	

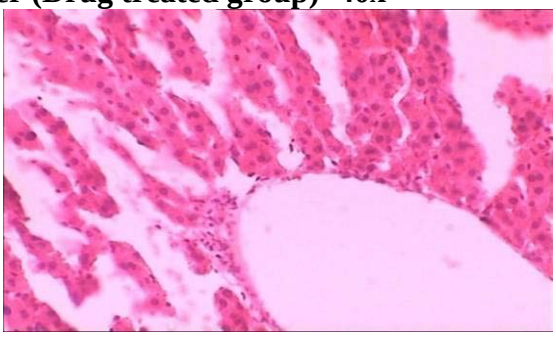
HISTOPATHOLOGICAL STUDY OF DIFFERENT ORGANS IN ALBINO RATS





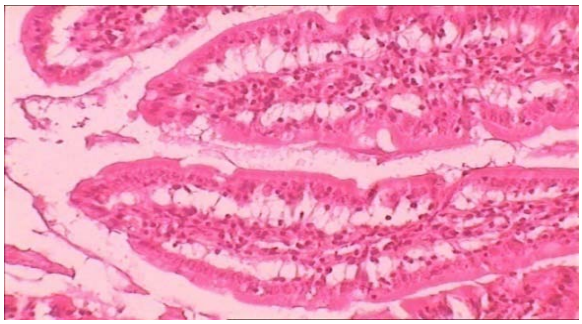
Section of Liver (Control group)- 40x Section of Liver (Drug treated group)- 40x

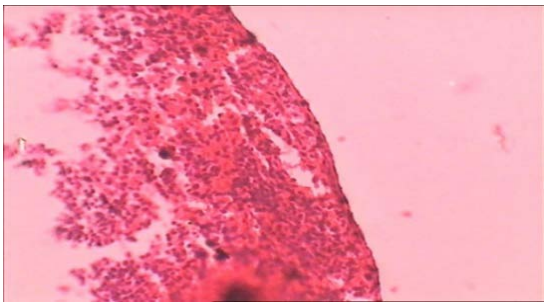




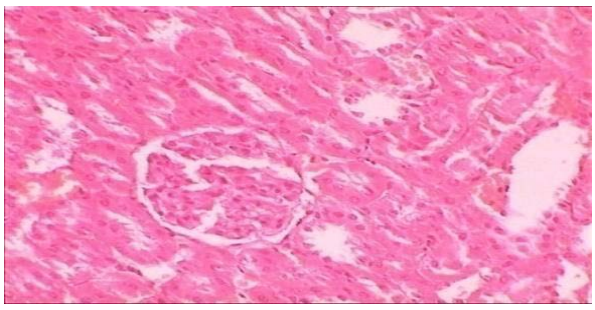
Section of Spleen (Control group) 40x

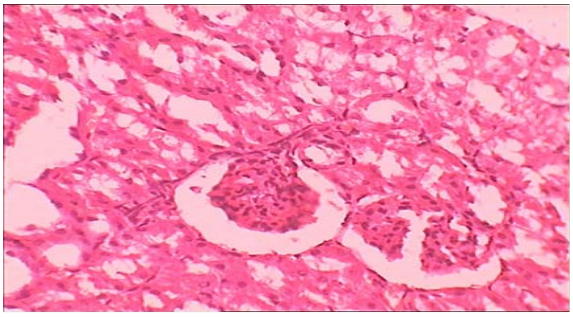
Section of Spleen (Drug treated group) 40x





Section of Intestine (Control group) 40xSection of Intestine (Drug treated group)40x





Section of Kidney (Control group) 40x **Section of Kidney (Drug treated group)40x**

PHOTOGRAPH: Tephrosia purpurea

Discussion-

It has been reported that root powder consumed with milk has diuretic action and cures liver and spleen diseases *(Ramesh R., 2000).Chopra et al. (1956)* considered this plant as a laxative. These facts suggest that some active principles from *Tephrosia purpurea* had been acting on the smooth muscles of the bowel and also the smooth muscles of urinary bladder. This apart some active principle in *Tephrosia purpurea* might have gain access to the central nervous system to cross the blood brain barrier and influence the feeding and satiety center located in hypothalamus. This is the first kind of the observation which suggests that the use of *Tephrosia purpurea* as tonic has a scientific footing.

An attempt was made to see if the drug influences gastro intestinal tract motility in the experimental animals as seen by the observation from Table no.02. It is clear that intestinal motility is enhanced by *Tephrosiapurpurea* in rats.

These observations tend to strengthen the view that constituents of *Tephrosia purpurea* have a stimulant effect on smooth muscles of the gut.It is well known that while sympathetic stimulation reduces gut motilityand the parasympathetic stimulation enhances the gut motility. *Ramamurthy and Srinivasan (1993)* studied the hepatoprotective effect of Tephrosia purpurea and also reported decrease in serum bilirubin level.

The observations made in the present study suggest an alteration in the bilirubin level in plasma of rats. No definite reason can be attributed to this change in bilirubin contents in the rats. Nevertheless the frequent use of *Tephrosia purpurea* in liver diseases has same kind of observation suggesting the effect of *Tephrosia purpurea* on liver function.

Nigam P. et al., 1982 and Afzal, S.G. et al. 1983 reported *Tephrosia purpurea* to be effective in acute and chronic hepatotoxicity and having liver tissue regenerating capacity. In present study also no significant change was observed on histopathological study of liver, spleen, kidney and intestine of rats.

The present study does not provide any clue and can't differentiate the effect of the drug on sympathetic and parasympathetic components of the autonomic nervous system, however the present observations clearly suggest that *Tephrosia purpurea* decoction preparation does influence the activity of the autonomic nervous system with consequent alterations in the functions of gastro intestinal tract, and possibly the urinary system

Conclusion-The aim of present experimental study was to assess the "Systemic effect of *Tephrosia purpurea* (*Sarapunkha*) on G.I.T"on albino rats.Tephrosia purpurea enhances intestinal motility in albino rats. Histopathological study of liver, spleen, and kidney, intestine revealed that*Tephrosia purpurea have no toxic effect.* Further longitudinal and more extensive studies are needed with large sample size to explore exact mechanism of action.

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