

EVALUATION OF ANTI DIABETIC EFFECT OF TRAILOKYAMOHANA RASA IN STREPTOZOTOCIN INDUCED HYPERGLYCEMIC MALE WISTAR RATS-AN EXPERIMENTAL STUDY

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ABSTRACT

Diabetes Mellitus is an Iceberg disease. It is ubiquitous malady of the world today, affecting 150 million people worldwide. The number was doubled by the year 2050 and with great saturation in China and India. India will become 'Diabetes Capital of world by 2050'. It is the 4th leading cause of death in USA. ICMR collaborative studies have found the prevalence of Diabetes Mellitus as 2.1% in urban and 1.5% in rural area. Special survey shows that 50 % of the cases remain undetected in the developed country like USA and only 10% are detected in developing countries like Senegal. Trailokyamohana rasa has been explained in classics in the context of prameha and as a study of reverse pharmacology and to evaluate the efficacy of my trial drug, it was proposed to investigate the influence of Trailokyamohana Rasa on blood glucose levels in Streptozotocin induced hyperglycemic male wistar rats. Hence in present study an effort were made to evaluate the anti-diabetic activity of Trailokyamohana Rasa.

KEYWORDS: Rasashastra, Trailokyamohana Rasa, Streptozotocin, Glibenclamide

INTRODUCTION

Diabetes Mellitus is an Iceberg disease. It is ubiquitous malady of the world today, affecting 150 million people worldwide¹. The number was doubled by the year 2050 and with great saturation in China and India. India will become 'Diabetes Capital of world by 2050'.² *Trailokyamohana Rasa*³ – *Sagandha*, *saagni paaradiya murcchana a kupipakwa Rasayana* is explained in *Rasa granthas* like *Rasa Pradeepa*, *Brihat Rasaraja Sundara*, *Rasa Yoga Sagar* etc. in the context of *Prameha (Diabetes Mellitus)*. As *Trailokyamohana rasa* has been explained in classics and as a study of reverse pharmacology and to evaluate the

efficacy, it was proposed to investigate the influence of *Trailokyamohana Rasa* on blood glucose levels in Streptozotocin induced hyperglycemic male wistar rats.

MATERIALS AND METHODS:

→Procurement of Raw Drugs: Vanga and Shilajatu were procured from Kajrekar and sons, Belagavi. Parada, Gandhaka, Mukta and other bhavana dravyas were procured from Dorle and Sons, Kolhapur.

→Procurement of Streptozotocin: Streptozotocin was procured from Shree Chemicals, Pune.

-->Preparation of Trailokyamohana Rasa: Preparation of Trailokyamohana Rasa was

done at BVVS Ayurved Medical College, Pharmacy.

→Animals: Healthy Male Wistar stain Albino rats weighing between 150-180 grams, were procured and maintained in Standard laboratory condition with normal diet and water for 30 days. Animals were approved by Institutional Animal Ethical Committee, Reg No

MUKHYA DRAVYA

S N	Sanskrit Name	English Name/Latin Name	Part Used	Quantity
1	Parada	Hydrargirum (Hg)	Whole Part	1Part
2	Gandhaka	Sulphur (S)	Whole Part	1Part
3	Vanga	Tin (Sn)	Whole Part	1Part
4	Shilajatu	Black Bitumen	Whole Part	1Part
5	Mukta	Pearl	Whole Part	1Part

BHAVANA DRAVYA

S N	Sanskrit Name	Latin Name/Family	Part Used	Quantity
1)	Pashanabheda	Bergenia lingulata / Saxifragaceae	Moola	Q.S.
2)	Kumari	Aloe barbadensis / Liliaceae	Patra	Q.S.
3)	Murva	Marsdenia tenacissima / Asclepiadaceae	Moola	Q.S.
4)	Guduchi	Tinospora cordifolia / Menispermaceae	Kanda	Q.S.
5)	Triphala a)Haritaki b)Bibhitaki c)Amalaki	Terminalia Chebula / Combretaceae Terminalia bellirica / Combretaceae Emblca officinalis / Euphorbiaceae	Phala	Q.S.

Procedure-

Shuddha Parada and Shuddha Gandhak was taken in khalwa yantra and kajjali was prepared. To this kajjali, vanga bhasma, mukta bhasma followed by shuddha shilajtu was added serially and triturated to make homogenous mixture. Later on bhavana of Pashanabheda swarasa, Ghrita kumari swarasa, Murva kashaya, Guduchi swarasa and Triphala kashaya was given in the serial order each for 5 days. After bhavana the bhavita kajjali dravya was dried and powdered. Later this kajjali was filled in Kachakupi and close the mouth of

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METHODOLOGY

Pharmaceutical Part³:

Trailokyamohana Rasa, a Kupipakwa Rasayana found explained in Brihat Rasaraja Sundara in the context of Prameha.

kachakupi with churna, masha and vatsanabha. Agni is given for 4 prahara in valuka yantra and preparation is collected after swangasheeta.

ANIMAL EXPERIMENTATION

Methodology⁵:

Overnight (12 hr) fasted animals were weighed and numbered.

→Streptozotocin (60 mg/kg) were injected IV/ (48 mg/kg) through IP.

→After one week of Streptozotocin injection, i.e. on 8th day (Fasted state) blood samples were collected for blood glucose estimation.

→Samples having blood glucose level $\geq 250\text{mg/dl}$ were selected for the study.

→9th day were considered as 1st day of drug administration and drugs were administered for 21 days.

→Blood samples were collected from tail vein and investigation of blood glucose level

and OGTT were done on 1st, 3rd, 5th, 7th, 15th and 21st day of drug administration.

GROUPING OF ANIMALS

Rats were divided into the following four equally sized groups for the study. Rats were taken for study after confirmation of a stable diabetic state.

Groups	No. of sampling Units	Treatment
Group I: Untreated control	n=6	Normoglycemic rats received 0.5 ml of distilled water/100 g body weight/rat/day by gavages forcefully.
Group II: Diabetic Control	n=6	Diabetic rats were included here and 0.5 ml distilled water was provided forcefully/100 g body weight/rat/day.
Group III: Standard drug group	n=6	Diabetic rats were given Glibenclamide in the calculated dose.
Group IV: Trial drug group	n=6	Diabetic rats were forcefully fed by gavage with 'Trailokyamohana Rasa dissolved in DMSO solution (universal solvent) in mentioned dose.

Rat Dose Calculation:

Rat dose was calculated by Extra polation method.

Rat dose= Human dose x 0.018 (Conversion factor).

$125 \times 0.018 \times 2$ (b.i.d dose) = 22mg/kg.

Data estimation:

Random blood sugar was estimated on 1st, 3rd, 5th, 7th, 15th and 21st day of drug administration.

The observations noted was meticulously maintained and interpreted through one way ANOVA test followed by Dunnett's test.

RESULTS

S	GROUP	DAY 1	DAY 3	DAY5	DAY 7	DAY 14	DAY 21
1	Normal	103.9±1.38	105.9±2.23	104.7±1.81	104.2±1.51	104.±1.12	103.7±0.95
2	Diabetic control	284.1±3.44	278.9±3.651	278.8±3.059	278.7±2.61	273.9±3.88	278.4±2.34
3	Gibenclamide	276.9±2.45	272±2.59	265.8±4.53	208±1.722	192±2.38	167.9±2.25
4	Trailokyamohana rasa	103.9264.6±3.03	264.7±3.161	241.1±5.74	221.2±5.65	159.4.±7.70	152.8±7.21

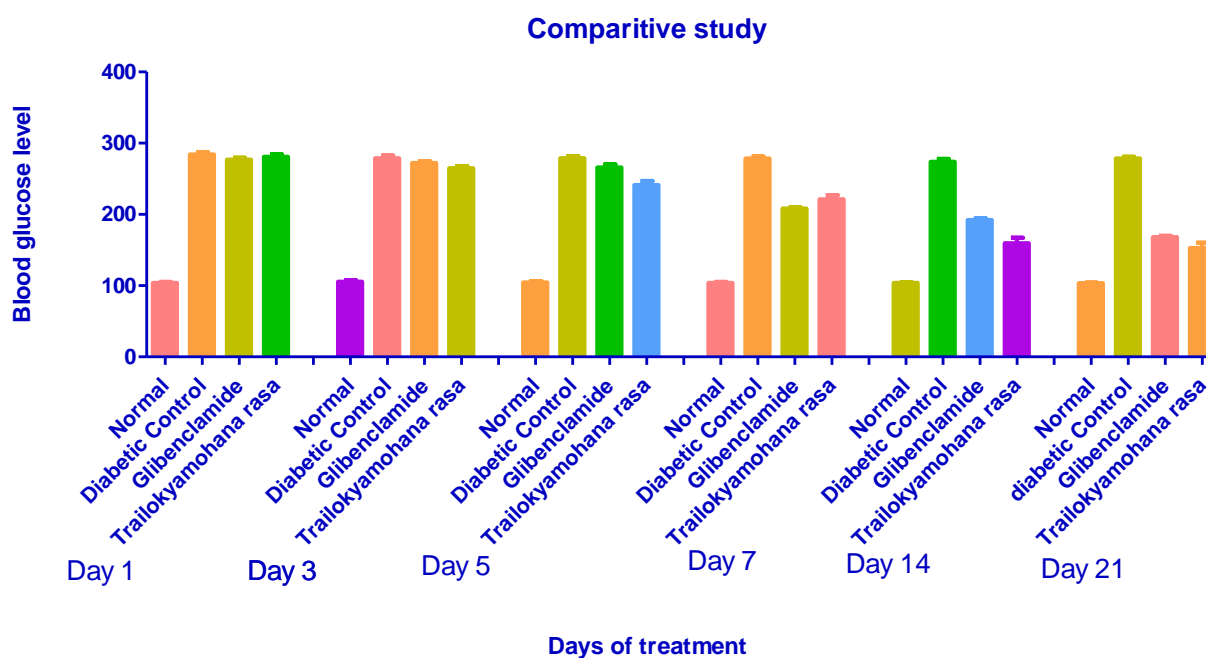
Results of the BSL level in complete animal experiment

Data: Mean ± SE

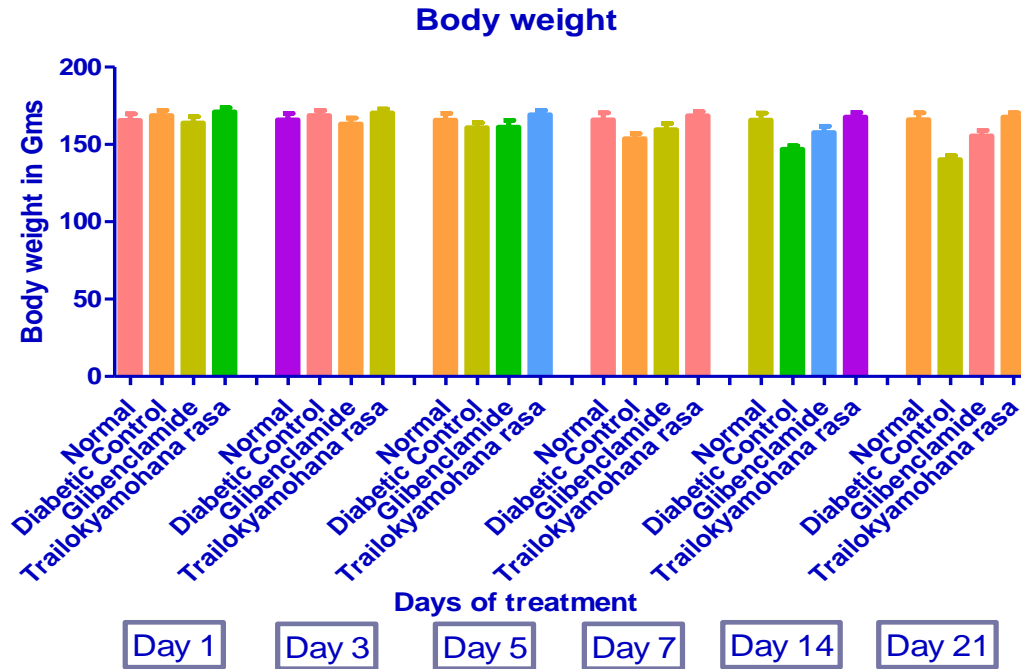
Results of the body weight of animals in complete animal experiment

Data: Mean ± SE

S N	GROUP	DAY 1	DAY 3	DAY5	DAY 7	DAY 14	DAY 21
1	Normal	165.5±4.28 3	165.9±4.20 2	165.7±4.44 0	165.9±4.58 6	165.7±4.55 0	166.1±4.37 5
2	Diabetic control	168.8±3.23 9	168.6±3.22 1	161.0±3.15 6	153.8±3.31 5	146.9±2.18 3	140.2±2.47 9
3	Glibenclamide	164±3.954 3	163.2±3.90 3	161.3±4.21 8	159.5±4.07 5	157.8±4.03 6	155.7±3.38 7
4	Trailokyamoha na Rasa	171.1±2.63 7	170.5±2.44 5	169.3±2.81 2	168.6±2.61 8	167.8±2.82 1	167.7±2.68 6



Graph showing the comparative study of BSL level of animals in Overall experiment.



Graph showing the comparative study of body weight of animals in Overall experiment.

DISCUSSION

Trailokyamohana Rasa is the type of antardhuma Kupipakwa method explained in the context of Prameha in the Brihat Rasaraja Sundara, a classical text of Rasashastra.

Group administered with Trailokyamohana Rasa showed significant decrease in blood glucose level throughout the study. Group administered with Glibenclamide showed decrease in the blood glucose level of samples.

Weight decrease of animals was significant in the group of disease control. The weight of normal group showed negligible reduction. Weight reduction in Trailokyamohana rasa group was less compared to the Glibenclamide group may be due to Rasayana gunas of the ingredients of Trailokyamohana rasa.

PROBABLE MODE OF ACTION OF TRAILOKYAMOHANA RASA:

Trailokyamohana Rasa mentioned in the classics of Rasashastra, contains Parada, Gandhaka, Shilajatu, Vanga bhasma and Mukta bhasma and has been explained in the context of Prameha.

Pharmacological studies conducted on Streptozotocin induced hyperglycemic rats revealed significant reduce in blood glucose levels when compared to the standard drug Glibenclamide. Even if one side of the test is crystal clear that Trailokyamohana Rasa helps in reducing the blood glucose level the curiosity of mode of its action remains unanswered but, an attempt is made to frame its mode of action based on properties of ingredients of Trailokyamohana Rasa.

Ingredients like Vanga⁵, Shilajatu⁶ and Mukta⁷ have been already proved as having

anti diabetic action but this part throws a focus probable.

Shilajatu: Experimental studies reveal that Shilajatu may be associated with phenomenon of reducing direct sugar and lipid from gut, thereby affecting the overall metabolic syndrome along with hyperglycemia⁸.

Shilajatu possesses the property of being 'dehadardhyakara' i.e. it is able to improve consistency and quality of tissue elements, which counteracts the shithilata produced in the body due to Prameha which is an important factor comprised in physical domain. It may have the potential of reducing cellular sensitivity towards circulating insulin.

Shilajitu possesses Tikta, Katu Rasa, Kashaya Anurasa, Katu Vipaka, Ushna Virya, Mutral, rasayana, amapachak, dhatupariposhan kramat sahayyak, mehanashak properties⁹. All these properties of Shilajatu are responsible for the samprativighatan of Prameha. As in Prameha Tridosha are involved, Shudha Shilajatu possess Tridoshashamak guna. Lekhaneeya property of shilajatu initiates lekhana process of the excess medas and expels the vitiated material from the Srotas. Lyses of excess of Meda also help in rectifying the insulin receptors which may be helpful in proper utilization of glucose by target cells.

Mukta: Mukta has Rasayana properties¹⁰, which produces its effect by enhancing the Agni and ojus status thereby an improved metabolic and immune status of the patient.

Vanga: Vanga bhasma has tikta rasa, ushna veerya and ruksha guna¹¹. Vanga bhasma

does the shoshana of the vikrita kleda and all other secretion which get increased due to prameha either it is related to mutravaha srotas or from the swedavaha srotas.

Action like medohara and lekhana may be helpful in reducing abadha meda which in turn facilitates circulation and normal binding of insulin, rectifying the receptor it may be helpful in proper utilization of glucose by target cells.

Kajjali: Parada Gandhaka kajjali will augment the anti-diabetic effect of Vanga, Shilajatu and Mukta.

CONCLUSION:

Trailokyamohana Rasa showed significant decrease in the blood glucose level when compared to standard Glibenclamide. Body weight reduction in samples was less in Trailokyamohana rasa group when compared to the diabetic control and Glibenclamide group.

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