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Evaluation of Anti-Hyperglycaemic Activity of Kaseesa Bhasma- An Experimental Study

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ABSTRACT

Diabetes mellitus is a global pandemic, as evident from the global cartographic picture of diabetes by the International Diabetes Federation. Diabetes mellitus is a chronic, progressive, incompletely understood metabolic condition chiefly characterized by hyperglycemia. Impaired insulin secretion, resistance to tissue actions of insulin, or a combination of both are thought to be the commonest reasons contributing to the pathophysiology of DM, a spectrum of disease originally arising from tissue insulin resistance and gradually progressing to a state characterized by complete loss of secretory activity of the beta cells of the pancreas. DM is a major contributor to the very large rise in the rate of non-communicable diseases affecting developed as well as developing nations.in this study till date no research work has been carried out i.e Kaseesa Bhasma given along with jambu beeja choorna as a anupana which is a kharaliya Rasayana and mentioned as Rasayan in rasa classics, as it is given in the form of Bhasma there will be increased bioavailability by reducing the particle size and indicated in, Madhumeha (Diabetes Mellitus), So it was thought worthwhile to undertake such study.

KEYWORDS: *Kaseesa Bhasma, Jambu Beeja Choorna, Diabetes Melli tus, Glibenclamide*

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INTRODUCTION

Madhumeha is one of the types of Vataja Prameha that has been considered as Mahagada. Due to the indulgence in etiological factors it results in the aparipakva kapha and meda which further proceed downward through the Mutravaha Srotas and get localized at Basti Mukha and leading to the symptoms like prabhoota mutrata, avila sssmutrata etc. Diabetes Mellitus taken as the parallant disease for Madhumeha is known from the dawn of civilization. Sedentary life style, Lack of exercise, Faulty food habits and improper medication and Urbanization precipitate the disease. Diabetes Mellitus is a metabolic disorder biochemically characterized by hyperglycaemia, glycosuria, polydipsia and polyphagia in which carbohydrate utilization is reduced and that of lipid and protein enhanced; it is caused by an absolute or relative deficiency of insulin and is characterized by Hyperglycemia. The mortality rate due to Diabetes mellitus is very high and is ranked fifth amongst the ten major causes of death in southern part of India

The rising prevalence of diabetes is closely associated with industrialization and socio- economic development. The prevalence of Diabetes in adults globally was estimated to be 150million and this figure is expected to double by 2025. Though Diabetes Mellitus was common in all populations of westernized countries, it has now dramatically increased in certain ethnic groups with modernization. (2) Although the prevalence of Type I and Type II D. M. is increasing worldwide, the prevalence of Type II D. M. is expected to rise more rapidly in future because of increasing obesity and reduced physical activity. In spite of tremendous advancement of modern system of medicine i. e. oral hypoglycemic agent and insulin till date is unsatisfactory, *Ayurveda* has described that a rational treatment is one where the medicine modifies the disease; hence attention towards searching an ideal drug which can control diabetes and which is harmless also having a rejuvenating effect is necessary to manage the highly prevailing disease.

Due to all these things it has become a challenge for *Ayurvedists* to search for an best oral hypoglycaemic agent which is safe and effective.

Hence the present study is undertaken amd entitled as "***Pharmaceutico-Analytical and Experimental study to evaluate Anti-hyperglycaemic activity of Kaseesa Bhasma***"

MATERIALS AND METHODS:

EXPERIMENTAL STUDY[3]

➢ OBJECTIVES OF THE STUDY:

- To evaluate the Anti-hyperglycaemic activity of *Kaseesa Bhasma* on streptozotocin induced albino wistar rats.
- To evaluate the Anti-hyperglycaemic activity of *Jambu Beeja Choorna* on streptozotocin induced albino wistar rats.

STUDY DESIGN:

➢ SOURCE OF ANIMALS:

Albino wistar rats: the required number of animals were procured from PES college of pharmacy Bengalore, the rats weighing between 150-200grams were procured.

SOURCE OF STANDARD DRUG:

The standard drug Glibenclimide was procured from MP Biochemicals, Pune.

➢ SOURCE OF CHEMICAL FOR INDUCTION OF DIABETES

Streptozotocin was procured from MP Biochemicals, Pune.

➢ Materials and Mehods:

➢ Materials: -

➢ *Trial drugs used for the experimental study:*

Kaseesa BhasmaJambu Beeja Choorna Glibenclimide

➢ EXAMINATION OF ANIMALS PRIOR TO THE EXPERIMENT:

All the wister albino rats were subjected to general checkup for sex and weight, the animals with abnormal behavior amd helath were excluded.

➢ HOUSING:

Animals were housed in sterile polypropylene cages containing sterile paddy hus*k* as bedding material with maximum of six animals in each cage, the rats were fed on standard food pellet and water *ad libitum.*

➢ MAINTAINANCE:

The animals were acclimatized and maintained with 24^{o}C ± 2^{o}C, 70%RH and 12/12h light and da*rk* cycle throughout the study at animal house, department of pharmacology P, E, S College of pharmacy Bengalore, guidelines (CPCSEA) and approval was obtained from Institutional Animal Ethical Clearance Comitee (IAEC) CPCSEA Reg no: 600/PO/Re/Rc/S/02/CPCSEA for laboratory animals.

➢ ROUTE OF DRUG ADMINISTRATION:

The dosage forms of *Kaseesa Bhasma* and *Jambu Beeja Choorna* were administered through the oral route by intragastric tube using 5ml syringe fitted with number 18 gauze

➢ DOSE CLACULATION:

- The dose for Rats was calculated by referring the table of Paget and Barnes: i, e Rat Dose =Human Dose mg/kgbw X $K_m$ratio/kgbw the therapeutic Human dose of *Kaseesa Bhasma*-3 Ratti it is give twice a day 750mg/day. therefore Rat Dose =Human Dose X 6.2 =77.50mg/kgbw Rounded to **80mg/kg /bwpo** hence rat dose of *Kaseesa Bhasma* 16mg/kg/bwpo given twice a day i.e Each time 8mg.
- The therapeutic Human dose of *Jambu Beeja Choorna* - 6gm it is give twice a day 12gm/day. therefore Rat Dose =Human Dose X 6.2 =1.24gm/kgbw hence rat dose of *Jambu Beeja Choorna* is 1.24gm/kg /bwpo given twice a day i.e Each time 620mg/kg/bwpo.

• DOSE OF STANDARD DRUG:

Based on Paget and Barnes formula standard drug Glibenclamide was administered orally in the dose of 5mg/kg/bwpo.

• RANDOMISATION AND GROUPING:

Animals are randomly selected and grouped into 6 groups of six animal each.

• INDUCTION OF DIABETES IN ALBINO WISTAR RATS:

Streptozotocin: Dose: 60mg/kgbw I, p

12MG of Streptozotocin for each wistar albino rat weighing 200gm

Table No 1: - Treatment Protocol

Group	Group name	Treatment	Dose	Frequency	Duration
I	Normal vehicle	Vehicle	2ml/kg bwpo	Daily 1-33	33 days
II	Hyperglycaemic (DM) rats	STZ	60mg/kg bwip	Once 1st day	1 day
		Vehicle	2ml/kg bwpo	Daily 2-33	32 days
III	Hyperglycaemic (DM) rats+ *Kaseesa Bhasma*	STZ	60mg/kg bwip	Once 1st day	1 day
		Kaseesa Bhasma	80mg/kg bwpo	Daily 4-33	30 days
IV	Hyperglycaemic (DM) rats+ *Jambu Beeja Choorna*	STZ	60mg/kg bwip	Once 1st day	1 day
		Jambu Beeja Choorna	1.24gm/kg bwpo	Daily 4-33	30 days
V	Hyperglycaemic (DM) rats+ *Kaseesa Bhasma Jambu Beeja Choorna*	STZ	60mg/kg bwip	Once 1st day	1 day
		Kaseesa Bhasma	80mg/kg bwpo	Daily 4-33	30 days
		Jambu Beeja Choorna	1.24gm/kg bwpo	Daily 4-33	30 days
VI	Standard group	STZ	60mg/kg bwip	Once 1st day	1 day
		Glibenclamide	5mg/kg bwpo	Daily 4-33	30 days

Table No 2: Parameters to be Evaluated:

Sl. No	Parameters to be studied	Types of Parameters
1.	Physical parameter	Body weight
2.	Blood parameter	Blood Glucose level (FBS, RBS, PPBS, HbA1C)
3.	Serum profile parameters	LDL HDL VLDL Total Cholesterol Triglyceride
4.	Tissue antioxidant parameters	SOD LPO Catalase
5.	Histopathology	Pancreas Liver

Euthanasia- The rats were sacrificed by over dose ketamine (120mg/kgbw ip) anaesthesia. The liver and pancreas were dissected out and weighed. The portion of liver and pancreatic tissue used for the histopathological evaluation. The samples was stained with haematoxylin and eosin and assessed microscopically.

Statistical analysis:

The data is expressed as mean ± SEM. The statistical analysis is performed by one-way analysis of variance (ANOVA) followed by Dunnett's test for multiple comparisons. Level of significance is determined in comparison with the control group. $P<0.05$ was considered as significant.

OBSERVATIONS AND RESULTS

Experimental study results:

1. BODY WEIGHT

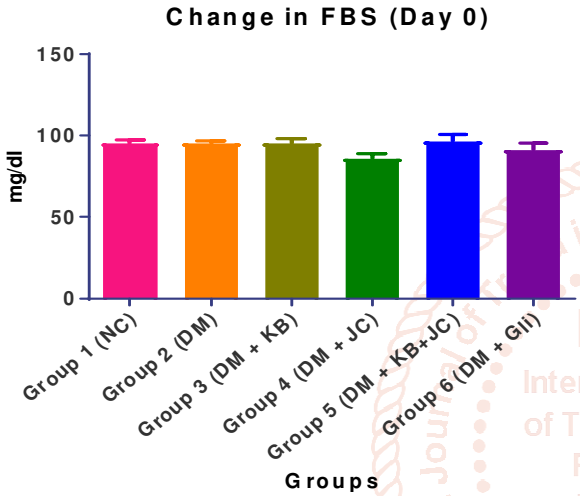
TABLE NO 3: EFFECT OF *KASEESA BHASMA* (*KB*), *JAMBU BEEJA CHOORNA* (JB) AND COMBINATION (*KB* + JB) ON BODY WEIGHT (G) AND CHANGE IN BODY WT IN (%)

Group & Dose (mg/kg b. w.)	Day 0	Day 5	Day 15	Day 30	% change in Body wt (Day(0-30)
GI(Normal)	217.7±55.08	226.7±54.42	260.3±50.28	295.3±52.28	36%
GII.DM control	192±30.25	159±25.85	147.3±25.10	140.2±24.07	-27%
GIII(*KB*) (80 mg/kg)	172.6±38.21	145.5±16.85	136.7±14.73	127.8±14.44	-26%
GIV (JB) 1.24g/Kg)	176±45.25	152.8±33.46	143.7±32.27	132.8±31.33	-25%
G.V(*KB*+JB)	175.6±42.97	161.7±30.29	145.7±34.38	137.3±31.73	-22%
G.VI (Glibenclamide 5mg/Kg)	187.3±57.64	165.3±44.84	153.5±38.57	144±36.01	-23%

BLOOD SUGAR

TABLE NO 4: EFFECT OF *KB*, JB AND COMBINATION OF *KB*+ JB ON BLOOD SUGAR LEVEL IN DIABETIC RATS

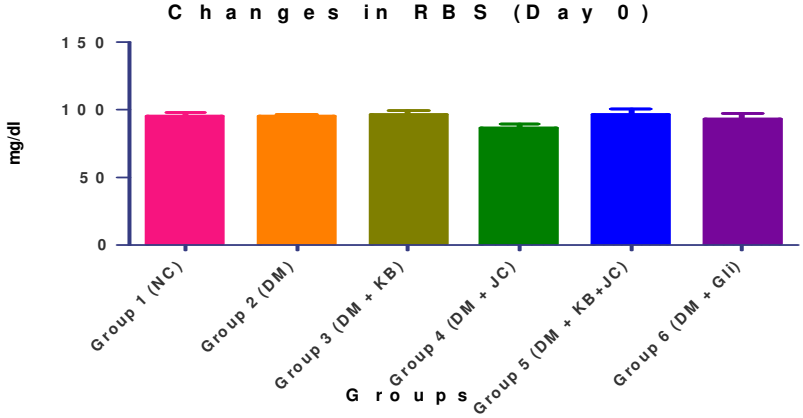
Group (n=6)	Day 0	Day 3 (STZ)	Day 5	Day 15	Day 30
I (Normal)	95.5±5.6	97.33±5.5	99.17±5.601	100.8±5.4	103.3±5.2
II (Control)	95.33±4.4	347.7±14.4 ^{a***} (265)	336.0±15.02 ^{a***} (252)	309±14.3 ^{a***} (224)	282.7±10.8 ^{a***} (197)
III (DM + *KB*)	95.33±7.3	247.2±6.91 ^{b***} (159%)	233.3±6.5 ^{b***} (145%)	211.0±6.3 ^{b***} (121%)	184.2±5.6 ^{b***} (93%)
IV (DM + JB)	86.33±6.8	247.8±6.8 ^{b***} (187%)	234.3±9.0 ^{b***} (171%)	213.3±8.8 ^{b***} (147%)	185.5±5.9 ^{b***} (115%)
V (DM + *KB*+JB)	96.67±10.2	238.3±6.3 ^{b***} (147)	222.5±3.6 ^{b***} (130)	202.5±3.2 ^{b***} (109)	176.8±4.2 ^{b***} (83)
VI (Standard)	91.33±10.9	248.7±7.5 ^{b***} (172)	230.7±7.9 ^{b***} (153))	207.3±6.2 ^{b***} (127)	180.7±8.8 ^{b***} (98)



RANDOM BLOOD SUGAR (RBS)

TABLE NO 5: EFFECT OF *KB*, JB AND COMBINATION (*KB*+ JB) ON RANDOM BLOOD SUGAR (RBS) LEVEL IN DIABETIC RATS

Group (n=6)	Day 0	Day 15	Day 30
I (Normal)	95.50±5.6	99.33±5.6	102.2±5.8
II (Control)	95.33±3.72^{ns}	297.7±10.7***	239±15.0***
III (DM + *KB*)	96.50±6.89 ^{ns}	206.7±4.9*** (-69%)	180±3.1*** (-74.8%)
IV (DM + JB)	86.83±6.13 ^{ns}	212.2±4.1*** (-71%)	185.3±2.1*** (-76.9%)
V (DM + *KB*+JB)	96.83±9.30 ^{ns}	207.5±3.2*** (-69.3%)	175.0±3.7*** (-72.8%)
VI (Standard)	93.17±11.09 ^{ns}	214.2±8.9*** (-71.7%)	177.7±3.7*** (-73.6%)



Post Prandial Blood Sugar (PPBS)

TABLE NO 6: EFFECT OF *KB*, JB AND COMBINATION (*KB*+ JB) ON PPBS IN DIABETIC RATS AFTER DAY 15

(n=6)	PPBS/ mg/dl on Day 15				
	0 min	30 min	60 min	90 min	120 min
I (Normal)	92.5±3.1	96.0±3.0	100.7±2.7	95.3±3.6	91.7±3.2
II (Control)	289.2±3.5	301.7±4.2	314.7±4.7	299.8±5.3	286.5±2.7
III (DM + *KB*)	211.8±2.3	224.7±2.2	234.3±3.6	223.0±2.4	209.8±2.3
IV (DM + JB)	215.5±1.9	230.3±2.2	244.2±2.9	227.7±1.8	214.3±2.0
V (DM + *KB*+JB)	203.3±2.2	215.8±2.3	229.3±3.8	214.5±2.6	201.3±2.2
VI (Standard)	208.5±1.9	220.0±3.7	237.8±2.3	218.3±3.3	207.3±2.2

TABLE NO 7: EFFECT OF *KB*, JB AND COMBINATION (*KB*+ JB) ON PPBS IN DIABETIC RATS AFTER DAY 30

(n=6)	PPBS/ mg/dl on Day 15				
	0 min	30 min	60 min	90 min	120 min
I (Normal)	102.7± 2.5	104.8±2.4	108.7±2.8	103.5±2.4	100.8±2.8
II (Control)	278.2±2.3	287±2.4	296.5±2.7	285.2±2.3	276.5±1.9
III (DM + *KB*)	185.8±2.5	197±2.4	208.5±3.9	195±2.4	184.2±2.9
IV (DM + JB)	190±2.4	201.3±2.2	212.2±2.3	199.3±2.2	188±2.4
V (DM + *KB*+JB)	178.2±2.6	189.2±2.6	201±2.9	187.8±2.5	176.5±1.9
VI (Standard)	182.2±2.3	193.8±2.6	204.7±2.2	191.8±2.6	180.2±2.3

HBA1c

TABLE NO 8: Showing the Results of HBA1c:

Treatment Groups	% of HbA1c (Glycated Hb)	% change
Group 1 (NC)	3.45± 0.45	-
Group 2 (DM)	11.7±0.44***	-
Group 3 (DM + *KB*)	6.87±1.32 ***	58.7 %
Group 4 (DM + JC)	5.58±0.54***	47.6%
Group 5 (DM + *KB*+JC)	3.81±0.40***	32.56%
Group 6 (DM + Gli)	3.76±0.38***	32.13%

TABLE NO 9: Overall table showing the effect on lipid profile

Group & Dose (mg/kg b.w.)	Rat number	Total Cholesterol	Triglyceride	HDL-Cholesterol	LDL-Cholesterol	VLDL-Cholesterol
GI(Normal)	1-6	74.00±3.162	77.50±1.871	26.50±1.871	27.50±2.168	15.50±1.871
GII.DM control	7-12	85.17±2.639	93.67±2.805	20.50±1.871	35.50±1.871	20.17±1.472
GIII(*KB*) (80 mg/kg)	13-18	65.00±2.828	72.17±2.317	31.67±2.160	21.17±2.317	12.67±2.160
GIV (JB) 1.24g/Kg)	19-24	67.17±3.430	74.00±2.608	31.33±2.160	21.33±2.733	13.50±1.871
G.V(*KB*+JB)	25-30	64.50±3.271	79.17±2.787	35.50±1.871	25.33±2.160	13.83±1.941
G.VI (Glibenclamide 5mg/Kg)	31-36	65.50±3.834	76.00±3.162	33.00±2.828	25.33±2.160	14.67±2.160

TABLE NO 10: OVERALL REPORT OF ANTIOXIDANT ACTIVITY

Group & Dose (mg/kg b.w.)	Rat number	SOD	LPO	Catalase
GI(Normal)	1-6	44.00±6.099	24.00±3.162	100.7±2.805
GII.DM control	7-12	35.50±4.637	35.50±3.082	79.50±3.271
GIII(*KB*) (80 mg/kg)	13-18	45.67±4.179	25.67±2.160	98.50±4.087
GIV (JB) 1.24g/Kg)	19-24	46.17±7.305	24.33±4.761	99.50±5.128
G.V(*KB*+JB)	25-30	50.33±4.320	28.83±2.317	101.5±5.891
G.VI (Glibenclamide) 5mg/Kg)	31-36	46.00±5.329	27.00±3.033	101.2±3.656

DISCUSSION:

Discussion on Experimental study:

The main aim of the present study was to evaluate the Anti-hyperglycaemic activity of *Kaseesa Bhasma* with *Janbu Beeja Choorna* as anupana on streptozotocin induced albino wistar rats at a dose of *Kaseesa Bhasma* 16mg/kg/bwpo, and *Janbu Beeja Choorna* 1.24gm/kg /bwpo

The Trial groups were compared with the standard drug and control groups.

Discussion on the experimental study can be depicted under the following headings:

- Physical parameter
- Blood parameter
- Serum profile parameters
- Tissue anti-oxidant parameters
- Histopathology

1. Physical parameter

Changes in body weight:

There was significant increase in body weight in both test drug groups 3, 4 &5 in comparison to normal control group.There was significant (P<0.05) decrease in weight in Diabetic group 2 compared to Control group.

2. Blood parameter:

On Fasting blood glucose level: on 0th, 3rd, 5th, 15th, 30th days The Diabetic animals in Group 3, 4, and 5 administration for 30 days with *Kaseesa Bhasma*, and *Jamboo Beeja Choorna* and combination respectively produced a significant reduction (P<0001) in FBS by 93%, 115%, 83, and 93% compared to Diabetic control (282.7±10.8 mg/dL).The animals treated with a combination of *KB* + JC showed maximum reduction(83%) in FBS compared to all other groups.The details of the results are shown in (Table no 4).

On Random Blood sugar level: on 0th, , 5th, 15th, 30th days The treatment with *KaseesaBhasma*, and *Jamboo Beeja Choorna* and combination for 30 days, the RBS level in treated group produced a significant reduction (P<0.0001) compared to diabetic control.The Group III showed a significant decrease by 74.8%, group IV animals decrease by 76.9% and the combination of *Kaseesa Bhasma*, and *Jamboo Beeja Choorna* Group V showed a decrease by 72.9 % in RBS compared to diabetic control having 239.15±15 mg/dl. Whereas standard group animal reduced up to 73.6%,. in RBS Blood parameter *Janbu Beeja Choorna* group iv significant result compared to the standard group.The details of the results are shown in (Table no 5).

On post prandial Blood sugar level: on day 30th the combination of *Kaseesa Bhasma*, and *Jamboo Beeja Choorna* Group V showed a decrease by 176.5±1.9 in PPBS compared to diabetic control having180.2±2.3 mg/dl.The details of the results are shown in (Table no 6, 7).

On HbA1c: on day 30th Glycated haemoglobin is referred to as HbA1c.It occurs when haemoglobin, a protein found in red blood cells that transports oxygen throughout the body, binds to glucose in the blood, causing it to become glycated. Glycated haemoglobin is measured. Over the course of weeks/months, the amounts have fluctuated. HbA1c can be used to diagnose diabetes.

Treatment with *KB*, JB And combination *KB*+ JB to Streptozotocin induced diabetic rats for 30 days had produced significant changes in glycated Haemoglobin level as shown in (table no 77).The administration of STZ to Group II animals had produced significant increase (P<0001) in HBA1c level to 11.7±0.44 3.45± 0.45 (310% increase).Upon treating for 30 days with *KB*, JB combination of (*KB* + *JC*) and Glibenclamide, the level of HBA1c was significantly (P<0.0001) decreased by 6.87±1.58.7, 5.58±0.54, 3.81±0.40, and 3.76±0.38 respectively compared to diabetic control which is having 11.7±0.44 percentage. The details of the results are shown in (Table no 8).

Serum profile parameters:

Administration of STZ (45-60 mg/kg) in Group 2 diabetic animals had did not produced a significant increase (NS=P<0.701) in Total cholesterol level it includes LDL, HDL, VLDL TC, TG when compared by unpaired t-test with normal animals. However, treatment with *KB*, JC and combination (*KB*+JC) for 30 day in Group III, IV, and V animals had produced a significant (P<0.0001) decrease in total cholesterol compared to diabetic control animals. Similarly, a significant (P<0.0001) decrease was observed in Group VI animals which were treated with Glibenclamide in (table no 9).

3. Tissue anti-oxidant parameters:

Lipid Peroxidation-

The Diabetic induced group showed significant increase in the levels of tissue LPO when compared to normal group. The Group 3, 4, 5, & 6 all showed a significant decrease in LPO levels as shown in (table no 98) compared to the induced group. It shows treatment has improved the vitality of the tissues and helped to repair the damage caused due to induction of Diabetes.

Superoxide Dismutase:

The study of antioxidant activity of *KB*, JC, and combination (*KB*+*JC*) for Superoxide dismutase level against DM is shown in (Table 97).With Dunnet's multiple comparison revealed that STZ caused a moderate significant decrease (P<0.001) in SOD level in Group II compared to normal animals Group I indicated oxidative damage in tissue. This oxidative stress was reversed with a highly significant (P<0001) increase by Group V (*KB*+*JC*) combination treated animals and moderately significant increase (P<0.001) in Group III, IV and VI when compared to Diabetic group animals.

Catalase:
The study of antioxidant activity of *KB*, JC, and combination (*KB+JC*) for catalase against DM is shown in (Table and Fig).With Dunnet's multiple comparison revealed that STZ caused a highly significant decrease (P<0.0001) in catalse level in Group II compared to normal animals Group I indicated oxidative damage in tissue. Treatment for 30days with *KB*, JC, and combination (KB+JC) in Group-III, IV, V and VI had highly significantly increased (P<0001) the antioxidant catalase level by 98.50±4.0, 99.50±5.1, 101.5±5.8, and 101.2±3.6 respectively when compared with Group -II Diabetic control (79.50±3.2).is shown in (Table 10).

4. Histopathological Study of Pancrea and Liver:
Histopathologically, Control Group rats did not exhibit any histopathological abnormality & damage. Group 2 rats had: Pancreas vascular changes with islets degradation. Group 3 Normal distribution of Acini, delicate collagen fibres around islets of Langerhans. Group 4 & group 5 rats both had Pancreas- minimal vascular changes with islet cell regeneration, Group 6 did not exhibit normal histological structures and regeneration of islets cell,

In histopatholgy of liver microscopy report: The section study of liver shows there is no as such marked changes seen in liver parenchyma, and hepatocytes of the liver, except DM control group where The Section studied shows liver parenchyma with intact architecture. exhibits intact hepatocytes, congested sinusoids with periportal mild chronic inflammation and congested blood vessels. Hence *Kaseesa Bhasma* along with *Janbu Beeja Choorna* as *a anupana* is effective in treating Diabetes Mellitus significantly comparable with standard drug.

Probable Mode of Action:

➢ **Probable Mode Of Action Of *KaseesaBhasma*:-**

'*Kaseesa Bhasma*' is expected to act on Vatavaha srotas in general and in particular it may act on *medaovaha srotas* i.e. in *Madhumeha*, because of its, *Kashayarasa, Lekhana* and *Rasayana* property.

And also *Kaseesa Bhasma* is effective in *vata- kapha prakruti*, by its, *kashayarasa and katu vipaka* The *lekhana* property of *Kaseesa* may be helpful in elimination of stagnated *mala [sanchita medas]* in *medavaha srotas* and *samprapti vighatana* of *Madhumeha*, kashaya rasa may be helpful to reduce the *atipravruthi, and vimargagamana of doshas* in *mutravaha* and *medovaha srotas*.and also it does *sthambana of kleda pravrutti in mutravaha srotas*, Hence after eliminating the toxins it may be acting as renal threshold modulator in the management of *Madhumeha*. Due to its *ushna veerya Agnideepana* property might be helpful in correcting the *Jatharagni* and *Medodhatwagni* dusti in *Madhumeha*.

Kaseesa Bhasma is said to have *Vata-kaphanashaka* property which may be effective in *Vataja* variety of *prameha* i.e. *Madhumeha*, and as *Kaseesa Bhasma* mainly acting on *vatavahasrotas*. Thus *Kaseesa Bhasma* may influence on the functions of Pancreas.

Effect on body weight: On body weight: this above result shows that due to *rasayana* property of *KaseesaBhasma* does poshana to *rasa raktadi dhatus* and maintained the body weight status throughout the study.

➢ **Probable Mode Of Action *Janbu Beeja Choorna*:-**

In present study was selected as *Janbu Beeja Choorna* Anupana might have helped in enhancing the Bio-availablility of *KaseesaBhasma*. Due to *kashaya rasa and kledaghnata of Janbu,* it is useful in *Bahu mutrata* and Aavilmutrata,. These all properties might have been helpful in reducing the subjective symptoms. In total *Kaseesa Bhasma* may be helpful to treat *Madhumeha* along with *Janbu Beeja Choorna*, because of its antioxidants *Rasayana* and catalyst property

➢ **CONCLUSION:**

Experimentally Significant results were obtained in Body weight, Blood parameters like FBS, RBS PPBS HbA1c, serum profile parameter like LDL, HDL, VLDL Anti-oxidant parameters like SOD, LPO, and Histopathological study of Liver and Pancreas.in normal & treated rats,

Hence *Kaseesa Bhasma* along with *Jambu Beeja Choorna* as a anupana is effective in treating Diabetes Mellitus significantly comparable with standard drug,

IMAGES:

Fig: 1 Albino Wistar Rat

Fig: 2 Polypropylene cage

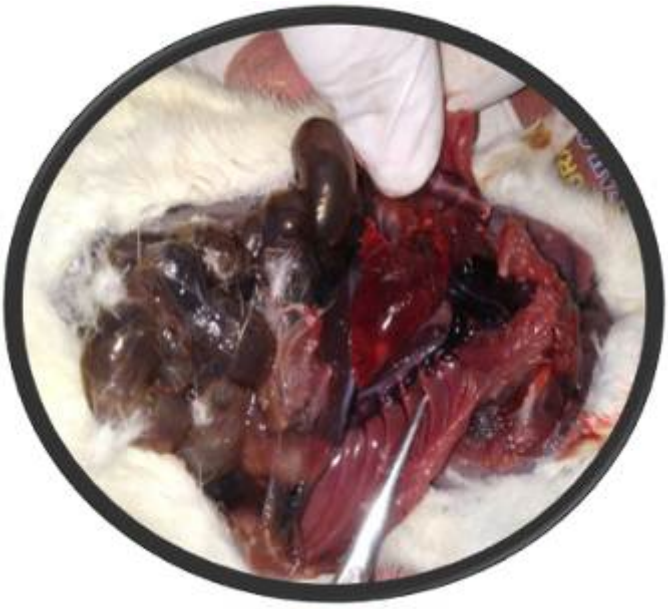


Fig: 5 Euthanasia of Albino Rat

Fig: 3 Induction of Streptozotocin

Fig: 6 Dissected liver and Pancrea

Fig: 4 Drug Administration By oral Gavaging method

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