

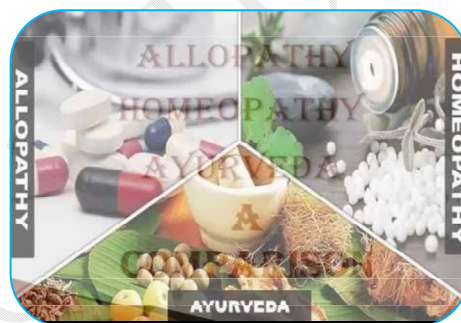


EFFECT OF ALLOPATHIC, AYURVEDIC AND HOMEOPATHIC DRUGS ON HEMATOLOGY OF ALLOXAN INDUCED DIABETIC ALBINO RAT

Pidiyar P. L. and V. T. Tantarapale
Post Graduate Department of Zoology,
Vidya Bharati Mahavidyalaya, Amravati.

ABSTRACT:

The presented investigation was the evaluation of Ayurvedic, Allopathic and Homeopathic drugs on hematology of Alloxan induced diabetic albino rat. The Ayurvedic drug (*Trigonella foenum extracts*) was 50 mg/kg/ twice a day; Homeopathic Drug (*Syzygium Jambolanum*) was 50 µl/kg/ twice a day and Allopathic Drug (*Metformin*) was 50 mg/kg/twice a day were administered. The diabetes was induced in rats by intraperitoneal administration of 50 mg/kg of body weight of Alloxan for three days. On the 3rd day, animals with blood glucose levels of 250 mg/dl and above were considered for experimentation. The results were cleared that all the tested drugs observed to be effective in reducing the diabetic condition with improving hematological profile in albino rats. Study cleared that the Ayurvedic Drug (*Trigonella foenum*) was found to be cheaper and promising than Homeopathic Drug (*Syzygium Jambolanum*) and Allopathic Drug (*Metformin*) in albino rat.



KEYWORDS: Ayurvedic, Allopathic, Homeopathic, Alloxan, diabetic albino rat.

INTRODUCTION:

Diabetes mellitus is commonly known as diabetes. It is a metabolic disorder that prevalent in both developed and developing country such as India. It is characterized by recurrent or persistent high blood sugar and casual plasma glucose more than 200 mg/dl. In general, there are three main types of diabetes mellitus. The sort 1 results from the pancreas' inability to deliver enough insulin because of loss of beta cells henceforth this structure was recently alluded

to as insulin-subordinate diabetes mellitus or adolescent diabetes. The sort 2 starts with insulin opposition, a condition where cells neglect to react to insulin appropriately. As the infection advances, an absence of insulin may likewise create. This structure was recently alluded to as non insulin-subordinate diabetes mellitus or grown-up beginning diabetes. The most well-known reason is a blend of inordinate body weight and inadequate exercise. The third kind is the gestational diabetes is the third fundamental structure,

and happens when pregnant ladies without a past history of diabetes grow high glucose levels (Chiang et al., 2014).

Insulin is the essential hormone that controls the take-up of glucose from the blood into most cells of the body, especially liver, fat tissue and muscle, except for smooth muscle, wherein insulin acts by methods for the IGF-1. Thusly, absence of insulin or the lack of care of its receptors expect a central employment in a wide range of diabetes mellitus. The body gets glucose from three crucial sources: the intestinal

ingestion of sustenance; the breakdown of glycogen (glycogenolysis), the limit sort of glucose found in the liver; and gluconeogenesis, the time of glucose from non-starch substrates in the body. Insulin expect a fundamental employment in changing glucose levels in the body. Insulin can stifle the breakdown of glycogen or the technique of gluconeogenesis, it can fortify the vehicle of glucose into fat and muscle cells, and it can invigorate the limit of glucose as glycogen (Shoback and Gardner, 2011). Insulin is released into the blood by beta cells (β -cells), found in the islets of Langerhans in the pancreas, in light of rising components of blood glucose, consistently in the wake of eating. Insulin is used by around 66% of the body's cells to ingest glucose from the blood for use as fuel, for change to other required particles, or for limit. Lower glucose levels result in decreased insulin release from the beta cells and in the breakdown of glycogen to glucose. This methodology is in a general sense obliged by the hormone glucagon, which acts in the opposite manner to insulin. In case the proportion of insulin available is insufficient, or if cells respond ineffectually with the effects of (insulin barbarism or insulin obstacle), or if the insulin itself is defective, by then glucose isn't acclimatized fittingly by the body cells that require it, and isn't secured appropriately in the liver and muscles. The net effect is tirelessly strange measures of blood glucose, poor protein amalgamation, and other metabolic perplexities, for instance, acidosis (Barrett, 2012).

At the point when glucose fixation in the blood stays high after some time, the kidneys achieve an edge of reabsorption, and the body discharges glucose in the pee that is glycosuria. This expands the osmotic weight of the pee and represses reabsorption of water by the kidney, bringing about expanded pee creation implies polyuria and expanded liquid misfortune. Lost blood volume is supplanted osmotically from water in body cells and other body compartments, causing lack of hydration and expanded thirst is polydipsia. Likewise, intracellular glucose insufficiency invigorates hunger prompting extreme nourishment consumption as polyphagia (Murray, 2012).

There is no known preventive measure for sort 1 diabetes. Type 2 diabetes records for 85 to 90% of all cases worldwide that can regularly be avoided or deferred by keeping up a typical body weight, participating in physical movement, and eating a solid eating routine. The correct prescription is fundamental control the diabetic condition. A medicine is a medication used to analyze, fix, treat, or avert infection. The medication treatment implies pharmacotherapy is a significant piece of the therapeutic field and depends on the exploration of pharmacology for constant headway and on drug store for fitting administration. In India, allopathic, ayurvedic/unani and homeopathic practices are most normal in treatment of diabetes (Qato et al., 2016).

Allopathic medication or allopathy is a deprecatory term utilized by advocates of elective drug to allude to present day logical frameworks of prescription, for example, the utilization of pharmacologically dynamic specialists or physical mediations to treat or stifle side effects or pathophysiologic procedures of ailments or conditions. The articulation was authored in 1810 by the maker of homeopathy, Samuel Hahnemann. Among homeopaths and other elective medication advocates, the articulation allopathic prescription is as yet used to allude to the general classification of restorative practice that is here and there called Western drug, biomedicine, proof based prescription, or current prescription (Roy, 2015). In allopathic treatment of diabetes, utilization of Metformin is exceptionally normal. It is taken by mouth (Malek et al., 2013).

The metformin use during pregnancy compared to insulin alone found good short term safety for both the mother and baby but unclear long term safety. Several observational studies and randomized, controlled trials found metformin to be as effective and safe as insulin for the management of gestational diabetes. Nonetheless, several concerns have been raised and evidence on the long-term safety of metformin for both mother and child is lacking. Compared with insulin, women with gestational diabetes treated with metformin gain less weight and are less likely to develop pre-eclampsia during pregnancy. Babies born to women treated with metformin have less visceral fat, and it has been suggested that this may make them less prone to insulin resistance in later life (Alqudah et al., 2018).

Ayurveda is a system of medicine with historical roots in the Indian subcontinent. Globalized and modernized practices derived from Ayurveda traditions are a type of alternative medicine. In

countries beyond India, Ayurvedic therapies and practices have been integrated in general wellness applications and in some cases in medical use. Ayurveda therapies have varied and evolved over more than two millennia. Therapies are typically based on complex herbal compounds, minerals and metal substances. Plant-based treatment in Ayurveda is derived from roots, leaves, fruits, bark, or seeds. The use of *Trigonella foenum - graecum* is thought to promote digestion, induce labour and reduce blood sugar levels in diabetics (Sharma, 2018).

Homeopathy is a system of alternative medicine created in 1796 by Samuel Hahnemann, now a day's, homeopathy is widely used in India. It is a safe, gentle, and natural system of healing that works with your body to relieve symptoms, restore itself, and improve your overall health. It is extremely safe to use, even with very small children and pets, has none of the side effects of many traditional medications, and is very affordable and made from natural substances (Frazier, 2018). In homeopathic treatment of diabetes, use of *Syzygium Jambolanum* mother tincture is very common. This homeopathic remedy is prepared from the seeds of this plant. It helps in lowering the blood sugar levels and urine sugar levels as well it is effective to treat foot ulcers in diabetics (Raza *et al.*, 2017).

These all allopathic, Ayurvedic and homeopathic treatments to cure the diabetes are effective and well trusted. But the record of comparative effectiveness of these therapies is not well documented. Hence, in this concern, the present investigation was an attempt to compare the effect of allopathic drug (*Metformin*), ayurvedic drug (*Trigonella foenum* extracts) and homeopathic drug (*Syzygium Jambolanum*) on hematology of alloxan treated diabetic albino rat.

MATERIALS AND METHODS

Experimental animal: The presented investigation was the evaluation Ayurvedic, Allopathic and Homeopathic drugs on Alloxan induced diabetic albino rat. The available albino rats of either sex weighing 145±5g were used for this study. The animals were allowed to acclimatize in the research laboratory for 1 week before the commencement of the study. The animals had been maintained under standard conditions (room temperature 25°C±3, humidity 35–60%, and light and dark period 12/12 h). All animals were fed with food and water up to satiation. The study protocols were duly approved by the Institutional Animal Ethics Committee. The study was performed in accordance with the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines (Ene *et al.*, 2008).

Diabetes inducer: Alloxan is a derivative of pyrimidine. It is a toxic glucose analogue which selectively destroys insulin-producing beta cells in the pancreas when administered to rat. This causes an insulin-dependent diabetes mellitus in rat with characteristics similar to type 1 diabetes in humans. Alloxan is selectively toxic to insulin-producing pancreatic beta cells because it preferentially accumulates in beta cells through uptake via the Glucose transporter 2 glucose transporter. Alloxan, in the presence of intracellular thiols, generates Reactive Oxygen Species in a cyclic reaction with its reduction product, dialuric acid. The beta cell toxic action of alloxan is initiated by free radicals formed in this redox reaction. The alloxan does not cause any diabetic effects in humans (Lenzen, 2008).

Anti-diabetic drugs: Metformin Tablet / powder is commonly used Allopathic Drug with a proper diet and exercise program and possibly with other medications to control high blood sugar. Ayurvedic Drug *Trigonella foenum* extract was prepared by maceration; 1000 g of powder was soaked in about 1000 ml of distilled water for 7 days. The extract was decanted and the remaining material was re-soaked in distilled water. Both the extracts were dried completely by using Rotary Vacuum Evaporator. Homeopathic Drug *Syzygium Jambolanum* Mother Tincture (SBL, Kolkata) is made from the extracts from the seeds of the Jambolinum plant.

Conclusive Dose Safety Test: For the experimental assay, the drugs were orally administrated (Kumar, 2011). Because of availability of limited animals, the dosages were finalized with intense literature survey and critical logic. The Allopathic Drug (*Metformin*) was 50 mg/kg/twice a day; Ayurvedic drug (*Trigonella foenum* extracts) was 50 mg/kg/ twice a day and Homeopathic Drug (*Syzygium Jambolanum*) was 50µl/kg/ twice a day and were administrated. The doses were administrated twice a day by the intervals of 12 hours daily. No mortality was observed during the entire experiment. Animals

were observed for the next 21 days. All the selected doses of had no toxic effect on the normal behavior of the rats.

Induction of Diabetes and Grouping: The available albino rats of either sex weighing between 145±5 g were selected for the experimental trailer. At first, the blood of selected normal rats was analyzed for hematology. Then diabetes was induced in rats by intraperitoneal administration of 50 mg/kg of body weight of Alloxan for three days. On the 3rd day, animals with blood glucose levels of 250 mg/dl and above were considered for experimentation. The diabetic rats were conveniently divided into Groups I–III and treated with the following chart for 3 to 21 days.

The details of the groups are as given below –

Group	Code	Description	Dose
*	NDC	Non diabetic control albino rat	----
#	EDC	Experimental diabetic control rat (Alloxan)- .	50 mg/kg/day of BW
I	AYD	Ayurvedic Drug (<i>Trigonella foenum</i>)	50 mg/kg/ twice a day
II	HPD	Homeopathic Drug (<i>Syzygium Jambolanum</i>)	50 µl/kg/ twice a day
III	APD	Allopathic Drug (<i>Metformin</i>)	50 mg/kg/twice a day

Hematological Parameters: After 21 days of treatment, a whole blood sample was collected from retro-orbital plexus under anesthesia. The number, shape, volume, and the color of the RBCs indicate the quality of blood. Samples were added to a tube containing EDTA after specific period of treatment. The parameters were estimated with the help of Automated Analyzer (Yuet *et al.*, 2013). The haematological parameters, like haemoglobin, red blood cell, total white blood cells (WBCs), differential WBCs, packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular Hb concentration and platelet count were estimated during study.

Statistical Analysis: Data were collected, organized and analyzed using procedure of the Statistical Package for Social Sciences version 21.0 (SPSS for Windows 21.0, Inc., Chicago, IL, USA). Results were recorded as mean ± standard deviation (SD) of triplet.

RESULT AND DISCUSSION

Diabetes mellitus is commonly known as diabetes. It is a metabolic disorder that prevalent in both developed and developing country such as India. It is characterized by recurrent or persistent high blood sugar and casual plasma glucose more than 200 mg/dl. The proper medication is necessary control the diabetic condition. A medication is a drug used to diagnose, cure, treat, or prevent disease. The drug therapy means pharmacotherapy is an important part of the medical field and relies on the science of pharmacology for continual advancement and on pharmacy for appropriate management. In India, allopathic, ayurvedic / unani and homeopathic practices are most common in treatment of diabetes. During this assay, the Allopathic drug (*Metformin*) was 50 mg/kg/twice a day; Ayurvedic drug (*Trigonella foenum* extracts) was 50 mg/kg/ twice a day and Homeopathic Drug (*Syzygium Jambolanum*) was 50 µl/kg/ twice a day and were administrated to evaluate the effects on hematology in diabetic albino rat. For study, diabetes was induced in albino rats by intraperitoneal administration of 50 mg/kg of body weight of Alloxan for three days. On the 3rd day, animals with blood glucose levels of 250 mg/dl and above were considered for experimentation.

The effects of different drugs on haematological parameters like haemoglobin, red blood cell, total white blood cells (WBCs), differential WBCs, packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular Hb concentration and platelet count were estimated. The estimations were based on the following principals suggested by Barbar *et al.* (2012).

The results of the present study clears that the diabetes reduced the haemoglobin, red blood cell, lymphocytes, Monocytes, packed cell volume, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular Hb concentration and platelet count. The increased in the total white blood cells (WBCs), Neutrophils, eosinophils and basophils were also observed in diabetic rat. The

result cleared that Ayurvedic Drug (*Trigonella foenum*) was found to be cheaper and promising than Homeopathic Drug (*Syzygium Jambolanum*) and Allopathic Drug (*Metformin*) in albino rat.

These presented observations are in well agreement with comparisons between the earlier studies of Mowla *et al.*, (2009), Renuka *et al.*, (2010), Puri *et al.* (2011), Rohilla and Shahjad (2012), Khidir and Amel (2013), Nithya *et al.* (2014), Michael *et al.*, (2015), Anacletus *et al.*, (2016), Sathish *et al.*, (2016), Dina *et al.*, (2017), Siva (2017), Aftab and Huda (2018), Chakraborty (2018), Mooventhan and Nivethitha (2019) and a name a few.

Table 1: Effects of Drugs on Hematological profile in control and experimental albino rat

Sr.	Hematology	NDC	EDC	AYD	HPD	APD
1.	Haemoglobin (Hb) g/dl	13.46	10.79	13.97	13.01	12.79
	+SD	0.59	0.68	0.48	0.56	0.63
2.	Total red blood cells (RBC) 10^3 /mm ³	4.98	3.04	4.19	3.89	3.36
	+SD	0.19	0.16	0.13	0.12	0.17
3.	Total white blood cells (WBC) 10^3 /mm ³	8.02	10.69	7.37	7.18	11.8
	+SD	0.24	1.41	0.77	0.91	0.50
4.	Neutrophils %	0.46	2.15	0.45	0.34	0.28
	+SD	0.04	0.32	0.17	0.14	0.59
5.	Lymphocytes %	38.24	33.17	37.41	36.73	35.01
	+SD	0.87	1.63	1.04	1.23	1.19
6.	Monocytes	45.16	31.74	45.81	42.93	41.89
	+SD	2.22	3.08	2.17	0.27	0.39
7.	Eosinophils %	4.26	5.31	3.91	4.11	3.33
	+SD	0.44	0.16	0.31	0.53	0.43
8.	Basophils %	0.31	1.45	0.30	0.29	0.27
	+SD	0.03	0.22	0.91	0.79	0.27
9.	Packed cell volume (PCV) %	43.28	31.72	38.61	40.02	36.80
	+SD	0.69	1.52	0.78	0.65	0.82
10.	Mean corpuscular volume (MCV) fl	57.21	37.56	49.50	48.51	45.36
	+SD	1.60	1.67	1.01	0.87	0.84
11.	Mean corpuscular Hb (MCH) pg	19.91	17.63	19.61	19.14	16.83
	+SD	1.81	2.09	1.63	1.16	1.23
12.	Mean corpusc. Hb conce.(MCHC) g/dl	32.21	26.22	30.87	30.07	28.48
	+SD	1.04	1.14	1.12	1.10	1.01
13.	Platelet count 10^3 /mm ³	170.07	119.76	160.45	168.13	162.09
	+SD	2.47	2.92	2.01	1.96	1.89
NDC – Non diabetic control rat		AYD - Ayurvedic Drug (<i>Trigonella foenum</i> extracts) – 50 mg/kg/ twice a day				
EDC- Exp. diabetic control rat (Alloxan induced)		HPD - Homeopathic Drug (<i>Syzygium Jambolanum</i>) – 50 µl/kg/ twice a day				
		APD - Allopathic Drug (<i>Metformin</i>) – 50 mg/kg/twice a day				

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CONCLUSIONS AND RECOMMENDATIONS

In brief concluding the present investigations, it was cleared that the Ayurvedic drug (*Trigonella foenum*), Homeopathic Drug (*Syzygium Jambolanum*) and Allopathic Drug (*Metformin*) are commonly used to treat the diabetes. All these drugs were also observed to be effective in reducing the diabetic condition in albino rats. The finding clears the improvement to normalize the hematological profile content after treatment with Ayurvedic drug (*Trigonella foenum*), Homeopathic Drug (*Syzygium Jambolanum*) and Allopathic Drug (*Metformin*) in diabetic rat.

The present investigation provided the evidences that lend credence to the safety and efficacy of Ayurvedic drug (*Trigonella foenum*) followed by Homeopathic Drug (*Syzygium Jambolanum*). Hence the use of Ayurvedic drug (*Trigonella foenum*) followed by Homeopathic Drug (*Syzygium Jambolanum*) is recommended instead of Allopathic Drug (*Metformin*) in treatment of diabetes to avoid the side effects.

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Pidiyar P. L.

Post Graduate Department of Zoology, Vidya Bharati Mahavidyalaya, Amravati.