International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 03 | March - 2023 Impact Factor: 7.185 ISSN: 2582-3930

HYPOGLYCEMIC EFFECT OF SYZYGIUM CUMINI SEED AND CARICA PAPAYA LEAVES POWDER EXTRACT IN ALLOXAN INDUCED MICE

LAVANYA S [$] and DR SENDHILVADIVU M [*]

$ M.Sc Student, Department of Zoology, Queen Mary's College, Chennai.
*Assistant Professor Department of Zoology, Queen Mary's College, Chennai.

***Corresponding Author**
DR M SENDHILVADIVU
ASSISTANT PROFESSOR
DEPARTMENT OF ZOOLOGY
QUEENMARY'S COLLEGE
CHENNAI 600 004.

ABSTRACT

This study evaluated the hypoglycaemic activity of aqueous extract of Syzygium cumini , Carica papaya and Mixed group (Syzygium cumini and Carica papaya in equal amount) in alloxan-induced diabetic mice. Diabetic mice were treated with (200 mg/kg body weight) of herbal extracts daily.

The extract of Syzygium cumini, Carica papaya and Mixed group were tested for its efficacy in Alloxan at a dose (120mg/kg of body weight) induced diabetic mice.This study was conducted to compare the anti-diabetic effect of Syzygiumcumini, Carica papaya and Mixed group extracts on, blood glucose level in Alloxan induced diabetic mice.The results of the mixtures on syzygiumcumini seed extract treated group were found to restore the glycemic level to near the normal level thereby indicating antihyperglycemic activity of the herbal plants.

KEY WORDS: Diabetic mellitus, Plant Extract, Alternative medicine, Glucometer.

INTRODUCTON:

There is a global increase in the prevalence of diabetes mellitus predominantly, related to life styles and the resulting surge in obesity (American Diabetes Association). Diabetes mellitus is a metabolic disease characterized by disordered metabolism and abnormally high levels of blood glucose. It is a major public health problem affecting 285 million or 6.4% of the world population for the year 2010 (Forouhi NG, and Wareham NJ).

Management of diabetes without any side effect is still a challenge to the medical community. The use of the drugs is restricted by their pharmacokinetic properties, secondary failure rates, and accompanying side effects (Ozougwu JC *et.al*). Despite considerable progress in the treatment of diabetes by oral hypo glycemic agents, search for newer drugs continues because the existing synthetic drugs have several limitations (Kahanovitz L *et.al*). The available therapies for diabetes include insulin and oral antidiabetic agents such as sulfonylureas, biguanides, and -glycosidase inhibitors. Many of these oral antidiabetic agents have a number of serious adverse effects. Thus, the management of diabetes without any side effects is still a challenge (Bregu A *et.al*). In addition to death, diabetes also lead to many chronic conditions like neuropathy, nephropathy, and various vascular diseases associated with heart, kidney, brain, peripheral blood vessels and retinopathy (American Diabetes Association; Dorababu M *et.al)*. It has been reported that oxidative stress leads to excessive production of free radicals which are implicated in pathogeneses of diabetes and its complications (Dorababu M *et.al;* Halim EM) .Moreover, the excessive generation of free radicals associated with diabetes will result in oxidative damage, particularly in kidney, liver, eyes, small and large blood vessels, and immunological and gastrointestinal systems (Forouhi NG *et.al* ; American Diabetes Association)Although insulin and other artificially synthesized anti-diabetes drugs like acarbose and vogli ose are effective for the management of diabetes, they are far from satisfying the urgency for their enormous costs or undesirable side effects (American Diabetes Association; Singh S*et.al*)Thus, searching alternative anti-diabetic natural products from plants has received great attention. Medicinal plants and their extracts are natural remedies with enormous potential for treating various diseases, including depression and anxiety. Many cultivated and wild plants are used for the management of various diseases, specifically renal and hepatic diseases and those of the immune and cardiovascular systems. Currently, there is growing evidence on the efficacy of the use of medicinal plants supplements for T2DM prevention and management.

MEDICINAL IMPORTANCE OF *Syzygiumcumini*

Syzygiumcumini is alternatively named as, *Syzygium jambolana*, *Eugenia jambolana*, *Eugenia cumini*, *Myrtuscumini*, *Eugenia caryophyllifolia*, *Calyptran jambolana*, or *Eugenia djovant*. Its common names are jambolan, Indian blackberry, jamun, Portuguese plum, java plum, black plum, Malabar plum, Jamaica plum, damson plum, and purple plum (Banerjee A *et.al).* It commonly grows in evergreen forests, damp places, and along streams. The tree can also be planted in gardens and along the roadside, as it is large and densely foliaceous.

SYZYGIUM CUMINI SEED POWDER

Jamun-Indian Black Plum-Syzygium Cumini-Seed Syzygium cumini, known as jambul, jambolan, jamblang or jamun, is an evergreen tropical tree in the flowering plant family Myrtaceae.Jamun has many health and medicinal benefits. Jamun relieves stomach pain; reduce diarrhea & dysentery, and works against heart diseases, diabetes, allergies, viral infection, inflammation and gastric ulcer.The seeds of jamun are an effective medicine against diabetes and their powder is widely used in India to control diabetes. Jamun is indigenous to India. Its tree is tall and evergreen. Regulates Blood

Sugar Level. The leaves, barks, and seeds are the most useful parts among which the seeds are popular for their anti-diabetic properties. Acts as a Blood Purifier: Black Plum has adequate amount of iron and vitamin C.

Carica Papaya:

MEDICINAL IMPORTANCE OF Carica Papaya

Papaya (Carica papaya Linn.) belongs to the family Caricaceae and is well known for its therapeutic and nutritional properties all over the world. The major findings revealed that papaya leaf extract has strong medicinal properties such as antibacterial, antiviral, antitumor, hypoglycaemic and anti-inflammatory activity. Furthermore, clinical trials are needed to explore the medicative potential of papaya leaf. Graphical abstract Graphical abstract showing the medicinal properties of Carica papaya leaf. (Surya P Singh *et.al*)2020. Carica papaya is an essential medicinal plant having anticancer activities through diverse mechanisms and is not so far thoroughly investigated. In this review, we have summarized the systematic research outputs of different parts of the papaya plant extracts and elaborated the role of its phytochemicals, anticancer activities, therapeutic targets and mechanisms.

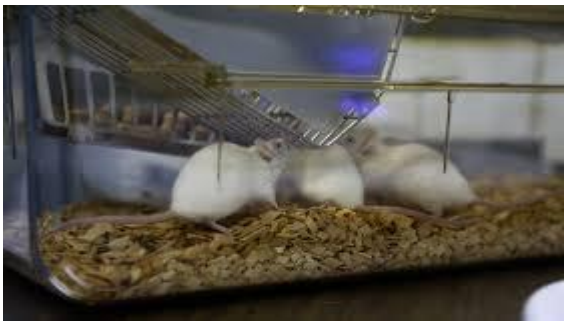
CARICA PAPAYA LEAVES POWDER

we have highlighted its bioavailability, natural food additive properties and cost-effectiveness. (Maruthanila V L , *et.al*)2021. *C. papaya* leaf juice has the potential to be a new drug candidate against dengue disease safely and effectively (Bee Ping Teh *et.al*)2022.The prevalence of viral infections, cancer, and diabetes is increasing at an alarming rate around the world, and these diseases are now considered to be the most serious risks to human well-being in the modern period. There is a widespread practice in Asian countries of using papaya leaves (*C. papaya* L.) as herbal medicine, either alone or in combination with prescribed medications, to treat a variety of ailments. The importance of conducting the necessary descriptive studies in order to determine the safety of papaya leaf consumption is also emphasized in the context of their application in the healthcare sector. The antidengue, anticancer, antidiabetic, neuroprotective, and anti-inflammatory effects of papaya leaves discussed in this article are supported by evidence from preclinical, *in vivo*, *in vitro*, and clinical trial studies, as well as from other sources.

MATERIALS AND METHOD:

EXPERIMENTAL ANIMALS:

This study used Male white albino mice aged (6-8 weeks) weighing 25 to 30g.The mice were acclimatized with free access to food and water. Nine rats randomly divided into 3groups; each group contains 3 animals (n=3).



EXPERIMENTAL INDUCTION OF DIABETES:

The animals were kept fasted for 8-12 hours before induction of alloxan, but allowed free access to water. Diabetes was induced in the mice by oral administration of alloxan (120 mg/kg body weight). Alloxan was first weighed individually for each animal, according to its weight, and solubilized with water. After 48 hours of Alloxan administration, blood glucose level was measured using a glucometer. Diabetic mice having blood glucose level above 100 mg/dL were selected for this study. All the animals (albino mice) used in this study developed diabetes mellitus after alloxan administration.

EXPERINMENTAL DESIGN:

The animals were divided into 3 groups (3 mice in each group).

Group I: Syzygiumcumini group

Alloxan (120 mg/kg body weight) and Syzygiumcumini seed extract.

Group II: Carica papaya group

Alloxan (120 mg/kg body weight) and Carica papaya leaf extract.

Group III: Mixed group

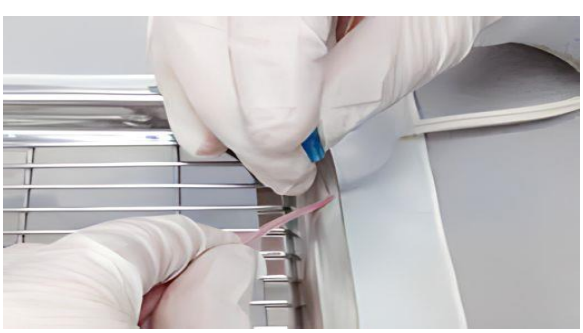
Alloxan (120 mg/kg body weight) and (Syzygiumcumini and Carica papaya) in equal amount.

S.NO	GROUPS	GROUP NAME	ALLOXAN DOSE (mg/Kg)	PLANT EXTRACT DOSE (mg/kg)
.1.	Group 1	Syzygium cumini	120 (mg/kg)	200 (mg/kg)
2.	Group 2	Carica papaya	120 (mg/kg)	200 (mg/kg)
3.	Group 3	Mixed (syzygium cumini and Carica papaya)	120 (mg/kg)	200 (mg/kg) Equal amount

In each group (n=3), one animal kept as control mice (no alloxan and no treatment) free access for food pellets and water, 2nd animal is Diabetic mice (Alloxan induced) without treatment and 3rdanimal is extract fed group (alloxan induced and mixed extract).Herbal treatment will be given for extract fed group for 8 days.

COLLECTION OF BLOOD SAMPLES:

Blood sample was collected from the mice by tail vein puncture. In the un anesthetized animals, lateral or dorsal veins are dilated by rubbing with xylol and then cleaning the part with spirit. The tail was grasped between the thumb and index finger and a needle (25 to 27 gauge and 0.5-1 inch long) is introduced near the distal portion of tail with bevel up. The drop of blood accumulated at the tip of tail after puncture was collected at the tip of Glucometer strip and reading was noted down.




ESTIMATION OF BLOOD GLUCOSE LEVEL:

On the 1st, 3r d,6thand 10th days of treatment, the blood glucose level was measured by the "Rupturing tail vein technique" using a one-touch glucometer.

RESULTS

The results of the hypoglycemic study conducted were recorded in the Tables (1-3)

TABLE NO :1 SYZYGIUM CUMINI GROUP

DAYS	Control mice (Animal no:1)	Diabetic Mice (Animal no:2)	Extract fed Mice (Animal no:3)
1st day	71	79	74
3rd day	72	140	148
6th day	73	230	132
10th day	74	342	72

Units: Glucose values are expressed as mg/dl n=3 in each group. Comparison made between normal control diabetic and extract fed (treated)

At the first day, before induction of Alloxan, normal blood glucose levels were checked for all animals, then Alloxan (120 mg/kgbody weight) is induced. After 48 hours of Alloxan induction ,during the 3rd day again blood glucose levels were measured to check the increased blood glucose levels. From the third day itself herbal treatment started for the extract fed group, Aqueous plant extract of Syzygiumcumini was given till the tenth day. Then blood glucose level was determined in the 6th and 10th day.

TABLE NO :2 CARICA PAPAYA GROUP

DAYS	Control mice (Animal no:1)	Diabetic Mice (Animal no:2)	Extract fed Mice (Animal no:3)
1st day	75	71	80
3rd day	76	168	175
6th day	76	289	120
10th day	78	393	97

Units: Glucose values are expressed as mg/dl n=3 in each group. Comparison made between normal control diabetic and extract fed (treated)

At the first day, before induction of Alloxan, normal blood glucose levels were checked for all animals, then Alloxan (120 mg/kgbody weight) is induced. After 48 hours of Alloxan induction, during the 3rd day, again blood glucose levels were measured to check the increased blood glucose levels .From the third day itself herbal treatment started for the extract fed group, Aqueous plant extract of Carica papaya was given till the tenth day. Then blood glucose level was determined in the 6th and 10th day.

TABLE NO: 3 MIXED GROUP (SYZYGIUM CUMINI AND CARICA PAPAYA)

DAYS	Control mice (Animal no:1)	Diabetic Mice (Animal no:2)	Extract fed Mice (Animal no:3)
1st day	75	71	80
3rd day	76	168	175
6th day	76	289	120
10th day	78	393	97

Units: Glucose values are expressed as mg/dl n=3 in each group. Comparison made between normal control diabetic and extract fed (treated)

At the first day, before induction of Alloxan, normal blood glucose levels were checked for all animals, then Alloxan (120 mg/kgbody weight) is induced.After 48 hours of Alloxan induction, during the 3rd day again blood glucose levels were measured to check the increased blood glucose levels. From the third day itself herbal treatment started for the extract fed group Aqueous plant mixed extract of Syzygium cumini and Carica papaya was given in equal amount till the tenth day. Then blood glucose level was determined in the 6th and 10th day.

DISCUSSIONS:

Diabetes is a major health challenge globally and it is on the increase as carbohydrate is the main food consumed by an average human. Up till now, no synthetic drug has been able to provide permanent cure to diabetes. Various in vivo models (e.g., diazoxide, alloxan, or streptozotocin-induced diabetic rats) are used in evaluating medicinal plants with suspected hypoglycemic potentials. In this study, diabetes mellitus was induced using alloxan at a dose of 120 mg/kg of body weight. This dose induced diabetes mellitus in the treated rats 48 hours after administration. Alloxan induces diabetes mellitus by selectively destroying the pancreatic beta cells.

After treatment, animals treated with varying of extract of S.cumini and C.papaya leaves had significantly lowered blood sugar when compared with diabetic untreated group as described in the table, This suggests that C. papaya leaves may have an extra pancreatic anti hyperglycemic mechanism of action. Several other plants and extracts have also been reported to have an anti hyperglycemic and an insulin-stimulatory effect. Most of the plants with hypo glycemic properties have been found to contain metabolites such as glycosides, alkaloid and flavonoids. One interesting finding of this study is that cumini reduces blood glucose level better than the carica papaya leaves. Similarly, the extract was able to restore the effect of alloxan-induced diabetes as no significant different was observed when he blood glucose level of animals treated with 200 mg/kg body weight of s.cumini seed extract when compared with the un diabetic animals (normal control) .

The results demonstrate that the extracts of Syzygium cumini seeds and Carica papaya leaves showed anti - hyperglycemic effect in diabetic model mice when the extracts were fed. In the Syzygium cumini group, blood glucose level was steadily increased in the control group (C) at 3rd,6th,10thdays of intervals.

In (Extract Fed) group the blood glucose level reduced consistently at 6th and 10 th days of intervals when compared to the control group. At the 10th day, the blood glucose level of Extract Fed mice was recorded almost equal to the normal value. In diabetic mice, a drastic increase in the blood glucose level was recorded when compared to that of normal mice. In the Ef mice, the blood glucose level reduced consistently at 6th, and 10th days intervals when compared that of control mice. Similar reduction in the blood glucose level was obtained in the mice fed with seeds powder of

Syzygiumcumini and mixed group. The mixed group also shows a hypoglycemic property, but syzygiumcumini extract reduces mice blood glucose level better when compared with the other two extracts. Evidence from current literature highlights the potential of seed, leaf, and fruit extracts from various *Syzygium* species in improving blood glucose and insulin regulation.

Conclusion:

The results of this study show that aqueous extract of Syzygiumcumini and Carica papaya and also combination of Syzygiumcumini and Carica papaya hashypoglycaemicpotential in alloxan-induced diabetic mice. Oral administration of aqueous extract of Syzygiumcumini is well documented that it has a better hypoglycemic effect than Carica papaya and mixed extract.

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