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A REVIEW ON GLYCEMIC CONTROL BY THE SEEDS OF SYZYGIUM CUMINI AND FRUIT OF MOMORDICA CHARANTIA

Biotechnology

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ABSTRACT

Nature is the best gift that humans are provided with. People always search for the nature's gift that soothes the mind and heals the body. Since time immemorial, plants were proven to be the good source for the extraction of drugs. According, to World Health Organization nearly 90% of the developing countries use plants and their products as the traditional medicine. Among all these plants, 800 plants were found to contain anti-diabetic potential which controls the sugar level in blood. Diabetes mellitus is the metabolic disease which is characterized by the increase in the blood glucose level and this leads to several other diseases. It also causes the spillage of glucose in urine and therefore it is termed as "sweet urine. This review focuses on the usage of the seeds of Jamun (*Syzygium cumini)*and fruit of Bitter melon (*Momordica charantia*) for the treatment of diabetes especially Type 2, and to control the blood sugar level (glycemic control) and aims to provide in-depth information about the anti-diabetic potential of the jamun seeds and anti-inflammatory activity of bitter melon. The seed of jamun and fruit of bitter melon also contains many phytochemical components which functions to bring hypoglycemic effect and the details about the various phytochemical agents are also explained in this review.

KEYWORDS

Jamun seeds (Syzygium cumini), Bitter melon (Momordica charantia) Diabetes Mellitus, Phytochemical properties of Jamun seeds and bitter melon, Hypoglycemic effect of Syzygium cumini, Antioxidant, Anti-inflammatory activity, Anticancer activity of Jamun and Bitter melon.

1.INTRODUCTION

Diabetes Mellitus is a metabolic disorder characterized by the increase in the blood glucose level Hyperglycemia. Developing countries like Pakistan has been mainly marketed by this impact. Diabetes causes cardio vascular diseases especially coronary heart diseases. The blood glucose level gets increased due to the lack of production of Insulin and also the excessive production and reduced usage of glucose by the human body. This can be classified into two types –Type 1 Diabetes Mellitus and Type 2 Diabetes mellitus.

Type 1 diabetes is the auto-immune disorder where the β -cells of pancreas is destroyed by T-Lymphocytes due to genetic predisposition and is most common among children and young people. Type 2 Diabetes Mellitus is more prevalent than Type 1 and caused due to the development of resistance against insulin. This review focuses on the usage of the seeds of *Syzygiumcumini* for the reduction in blood sugar level and this is done through a series of mechanisms where the bioactive components present in these seeds acts for glycemic control.

Figure1 and 2 -Representing the fruit of jamun (*Syzygium cumini*) (1)

From last twenty-five years studies explores that jamun has got a very good component of antioxidant properties which present in that naturally. The bioactive compounds present in jamun helps are very much helpful in preventing different metabolic activities.

The present research was carried out to evaluate the different aspects of jamun seeds which helps in preventing type2 diabetes, phytochemical compounds and all therapeutic activities of jamun.

Bitter melon (also known as Momordica charantia, bitter gourd, wild cucumber, and more) is a plant that gets its name from its taste. It becomes more and more bitter as it ripens.It grows during a number of areas (including Asia, South America, the Caribbean, and East Africa) where people have used bitter melon for a spread of medical conditions over time.

Figure 3 – Represents the Indian bitter melon (Momordica charantia) (2)

Bitter melon contains many nutrients which will be beneficial to your health. It's linked to lowering blood glucose, which some studies suggest means it can aid in diabetes treatment. Bitter melon is linked to lowering the body's blood glucose. this is often because the bitter melon has properties that act like insulin, which helps bring glucose into the cells for energy. The consumption of bitter melon can help your cells utilize glucose and move it to your liver, muscles, and fat. Several studies have examined bitter melon and diabetes. Most recommend conducting more research before using any sort of the melon for diabetes management.

Abbreviation

ABTS	2,2'-Azino bis (3-ethylbenzothiazoline-6-sulphonic acid)
BAT	Brown adipose tissue
CDK	Cyclin dependent kinase
CLN	Conjugated linolenic acid
COX	Cyclooxygenase
DCLK1	Doublecortin – like kinase 1
DCM-MET	Dichloromethane and methanol
DPPH	2,2-Diphenyl-1-picrylhydrazyl
FRAP	Ferric reducing powder
HDL-c	High density lipoprotein cholesterol
HDAC – 1	Histone deacetylase – 1
HX-XO	Hypoxanthine – xanthine oxidase
IHC	Immunohistochemistry
iNOS	Inducible nitric oxide synthase

LDL-c	Low density lipoprotein cholesterol
LK	Liver kinase
MAP 30	Momordica anti – HIV protein
MAPK	Mitogen – activated protein kinase
MCME	Methanolic extract of MC
MCP	Momordica charantia peroxidase
MCP – 1	Monocyte chemotactic protein – 1
MDRCP	Multidrug resistance conferring proteins
MMP – 9	Matrix metalloproteinase – 9
NF-k β	Nuclear factor kappa B
Nrf2	Nuclear factor erythroid 2 – related factor
O2-	Superoxide
OH	Hydroxyl
PARP	Poly (ADP-ribose) polymerase
SOD	Superoxide dismutase
TAE	Total aqueous extract
TNF – α	Tumour necrosis factor alpha
TPE	Total phenolic extract
WAT	White adipose tissue
WHO	World Health Organisation

2. Health Benefits Of Jamun Seeds And Bitter Melon

The present study is conducted taking into consideration the health benefits of S. cumini seeds. The Jamun seeds are utilized in treatment of Diabetes, allergies, virus infection, inflammation and peptic ulcer. It also has diuretic, anti-nociceptive, hypothermic, chemo-protective and cardio-protective effect. S. cumini seeds has been proposedas a prominent source of bioactive compounds against cardio metabolic disorder(Mukherjee et al., 2013). Jamun seed powder has been usedfor centuries as a natural ingredient for balancing the healthy blood glucoselevel. it's a detoxifying herb which helps to take care of natural urination andsweating. It also acts as liver stimulant, digestive, coolant and a bloodpurifier. Jamun seeds contain a glycoside, named Jamboline which helps inthe maintenance of glucose levels as within the normal limits. The jamun plant also contains a various assortment of secondary metabolites i.e., alkaloids, flavonoids, terpenoids, steroids, tannins, saponinsand reducing sugars that play an important role in preventing various diseases.(Swami et al., 2012)

Theanti-diabetic, anti-inflammatory, antiviral, antibacterial, anti-analgesia, antioxidant, anti-abortifacient of the varied parts of plants is thanks to the presence of diverse secondary metabolites. *Syzygium cumini* (L.) may be a widely used medicinal plant for the treatment of various diseases. The chief active constituent's anthocyanins, glucoside, ellagic acid, is quercetin, kaempferol and myricetin present in jamun impart multiple pharmacological activities to the plant which incorporates antidiabetic,anticancer, antioxidant, antibacterial, antifungal and antidiarrheal activity.

Figure 4 & 5: Showing the seed and the seed powder of Jamun (3)(4)

Jamun seeds not only have anti-diabetic properties, but also have other medicinal properties which are used in treating various other ailments. Traditionally, the fruits, bark, leaves, and seeds are used in Ayurvedic medicine and Unani system.

The tree has the ability to withstand both wet and dry conditions and also can tolerate prolonged flooding and drought. (Swami *et al.*, 2012)Not only the seeds of Jamun possess medicinal properties but also the other parts of the *Syzygium cumini* were reported they are antioxidant, Neuro-psycho pharmacological, anti-inflammatory, antifungal, anti-diarrheal, anti-fertility, gastro protective, anti-microbial, anti-bacterial and other radio protective activities.

Bitter guard is commonly called as bitter melon or karela which is widely grown in sub-tropical and tropical regions for fruits. Bitter melon is the most ripe and bitter among all the fruits. This melon is also used as the vegetable.(Joseph and Jini, 2013a). It helps in treating or preventing all kind of infections in stomach because of originality of the bitter melon's taste.

As a fruit that also has properties of a vegetable, bitter melon contains a good sort of vitamins, minerals, and antioxidants. it's been recognized by many cultures as having medicinal value. a number of its nutritional benefits include: vitamins C, A, E, B-1, B-2, B-3, and B-9 minerals like potassium, calcium, zinc, magnesium, phosphorus, and iron antioxidants like phenols, flavonoids.(Raman and Lau, 1996)

Uses In Traditional Medicine

A) Jamun

1. Traditionally the jambul fruits, leaves, seeds, and bark are all utilized in ayurvedic medicine.
2. The bark contains tannins and carbohydrates, accounting for its long-term use as an astringent to combat ailments like dysentery. A glycoside within the seed, jamun is taken into account to possess antidiabetic properties (Namasivayam *et al.* 2008).
3. The seeds have also shown anti-inflammatory effects in rats and antioxidant properties indiabetes.
4. Jamun fruit seeds and pulp are reported to serve various purposes in diabetic patients, like lowering blood sugar levels and delaying diabetic complications including neuropathy and cataracts (Chaudhuri *et al.* 1990)
5. All parts of the jamun are often used medicinally and it's an extended tradition in medicine (Giri *et al.*1985). Ayurvedic texts suggest that 1-3 g of seed powder per day is a mean dose. Additionally, juice of ripe fruits within the amount of 0.5-2 tsp (2.5-10 ml) a minimum of 3 times daily has beenrecommended for the treatment of diabetes.

B) Bitter melon

1. In different system of medicines, bitter melon is traditionally used as a medicinal food. (Aeri and Raj, 2020)
2. One cup of raw bitter melon gives 94grams of nutrients which could help in preventing blood glucose levels and all therapeutic activities.

Taking 2,000 mg of bitter melon daily will decreased haemoglobin A1c and controls blood sugar. It was confirmed in a recent 3-month studies in 24 adults with diabetes. Also taking bitter melon for 4 weeks in the composition of 2,000mg per day led to the most reduction in blood sugar levels. This was found to be another study in 40 people with diabetes. (Joseph and Jini, 2013a)

Table 1 - This table shows the composition of the nutrients (5)

Nutrients	Composition
Calories	**20**
Carbs	**4g**
Fibre	**2g**
Vitamin C	**93% of reference daily intake (RDI)**
Vitamin A	**44% of RDI**
Folate	**17% of RDI**
Potassium	**8% of RDI**
Iron	**5% of RDI**
zinc	**4% of RDI**

3. Bittermelon is an important micronutrient involved in bone marrow, wound healing and disease prevention. Especially, it is rich in vitamin-C.

Figure 6 – Health benefits of taking bitter melon(Tan *et al.*, 2016)

Anti-diabetic Action

ACTIVATION OF PPAR(γ)
↓
INHIBITION OF NF-kB
↓
SUPPRESSION OF INFLAMMATORY AND OXIDATIVE STRESS
↓
ACTIVATION OF β–CELLS OF PANCREAS
↓
UP REGULATION OF INSULIN
↓
GLUCOSE METABOLISM
↓
GLYCOGEN SYNTHESIS
↓
HYPOGLYCEMIC EFFECT

Human Trails On Antidiabetic Effect Of Jamun

Later, Kohli and Singh have also observed that administering 12 g of the Jamun seed powder in three divided doses for 3 months to 30 patients with "uncomplicated" noninsulin dependent DM caused a moderate hypoglycemic effect. (Kholi, *et al.,* 1999) . The effect of Jamun was like that of chlorpropamide. Jamun was shown to ameliorate polyurea, polyphagia, weakness, and weight loss. During this study, no sideeffects were observed, and this might be possibly thanks to the very fact that the powder was administered 3 times daily.(Sahna, et al., 2010).

However, there was no significant reduction within the postprandial blood glucose and glycosylated haemoglobin at the top of the third and sixth months, in comparison to the baseline. Furthermore, there was no change within the levels of triglycerides, total cholesterol,and LDL.(Sahana, et al., 2010)The fruit part extract from the screening ofα-amylase inhibitors is used by porcine pancreatic α-amylase (PPA). By using chromogenic di-nitro salicylic acid (DNSA) the inhibition assay were performed(Miller, 1959).

One unit of enzyme activity is defined as the amount of enzyme required to release one micromole of maltose from starch per min under the assay conditions.

Animal Trial On Antidiabetic Effect Of Jamun

Mycaminose is isolated from the seed kernel of *Syzygium cumini*. It is the antidiabetic activity extracted compound which is against the streptozotocin induced diabetic rats. *Syzygium cumini* seeds at the dose of 200mg/kg and 400mg/kg were administered to streptozotocin induced diabetic rats. Methanol extract and ethyl acetate compounds of Linn. Seeds, the mycaminose at the dose of 50 mg/kg were induced to the rats and they were found to be produced significant reduction of blood glucose level. Therefore, this indicates the methanol extract and the isolated compounds of “Mycaminose” and the ethyl acetate was against streptozotocin induced diabetic rats which possess antidiabetic effect(Naquibuddin et al., 2019).

Later, From the family of Wister Strain they were purchased the male albino rats weighing around 160-180g from the Tamil Nadu Veterinary and Animal Sciences University, Chennai for the trial study. They were fed with commercial pelleted rat chow and acclimatized to animal house conditions. (Hindustan Lever Ltd., Bangalore, India) and they had free access to water. Under the ethical norms and the guidelines given, the experiment were conducted and designed accordingly and approved by theGovernment of India and Institutional Animal Ethics Committee Guidelines and Ministry of Social justices Empowerment (Ravi, Sivagnanam and Subramanian, 2004).

3.2 Antidiabetic Effect Of Bitter Melon

3.2.1 Animal Studies Of *Momordica Charantia*

In this various animal studies have repeatedly shown the hypoglycemic effect of the whole MC plants, the seeds, the bark, the fruits and the pulp in normal animals (Day *C et al*., 1990). Especially, in *M.charantia* it supresses the postprandial hyperglycemia in rats (Uebanso T, Arai H, Taketani Y*, et al*. 2007) and enhance lipolysosis and insulin sensitivity (Chen Q, Chan LL & Li ET 2003) (Chen Q & Li ET 2005) and improves glucose tolerance (Leatherdale BA, Panesar RK, Singh G, *et al.* 1981). Recently the idea of vegetable insulin was isolated by Baldwa et.al (Baldwa VS, Bhandari CM, Pangaria A, et al. (1977) Clinical trials in patients with diabetes mellitus of an insulin-like compound obtained from plant source)And it was echoed that the zinc free protein bearing insulinnomimetric activities which was isolated from MC (Yibchok-Anun S, Adisakwattana S, Yao CY, et al. (2006) Slowacting protein extract from fruit pulp of *Momordica charantia*with insulin secretagogue and insulinomimetic activities. BiolPharmBul)

3.2.2 Clinical Studies Of *M.charantia*

The therapeutic effect of bitter melon was first documented by a physician called Lakholia in 1956 and he used himself as a subject (Lakholia AN (1956) The use of bitter gourd in diabetes mellitus. Antiseptic).

In John et.al study randomized fifty subjects (26 preliminaries and 24 controls) with type 2 diabetes (T2D) to get either dried MC natural product or riboflavin. Clear consideration measures in light of fasting glucose (FBS) and postprandial sugar (PPS) levels were embraced. Test size was determined utilizing a focused-on decrease of sugar level by 300 mg/l (30 mg/dl) for both FBS and PPS.Dried MC natural product was managed at a portion of 2 g multiple times for each day, and riboflavin was utilized as the fake treatment. FBS and PPS levels were estimated with fructosamine levels at pattern before treatment, at about fourteen days, and at a month post-treatment. Results didn't show a genuinely critical impact because of intercession, for which the creators attributed to the conceivable utilization of dried MC instead of new natural product, or because of an imperfect portion.

Thusly, it is difficult to do any meta-examination or between-study investigations. For simplicity of organization, it would be best for MC to be taken in exemplified powder; in any case, the accessible examinations appeared to highlight a superior adequacy for MC when taken in new or squeezed form((Srivastava et al., 1993),(Welihinda et al., 1986),(Joseph and Jini, 2013b)(Ahmad et al., 1999).

4. Phytochemical Compounds

4.1 Phytochemical Components Of Jamun

Syzygium cumini (L.) isbelonging to the Myrtaceae . Large trees cultivated throughout India for the edible fruits (Black Plum) and are reported to contain vitamin C , acid , tannins, anthocyanins, includes cyanidin, petunidin, malvidin glucoside and other component (Martinez and Del, 1981), (Wealth of India Raw materials 1976).*Syzygium cumini* may be a medicinal plant, whose parts were pharmacologically proved to possess hypoglycaemic, antibacterial, anti –HIV activity and anti- diarrhoea effects (Bhuiyan *et al.,* 1996), (Kusumoto *et al.,* 1995), (Indira and Mohan 1993), (Ravi *et al.,* 2004).

Seeds are said to contain various phytochemical components such as glucoside jamboline, phenolic substances such as ellagic acid, gallic acid, flavonoids, anthocyanins, Tannins, β–sitosterol etc.

Jambosine: Jambosine is the type of alkaloid, highly found in the seeds of *Syzygium cumini* that has been found very much important in regulating or blocking the conversion of starch into sugar.

Ellagic acid: Ellagic acid is the naturally occurring poly-phenolic compound. It regulates the vascular functions of blood vessels which are exposed to hyperglycemic formation by the reduction of oxidative stress. It also reduces insulin resistance.

Anthocyanins:

Anthocyanins present in plant extract are known to decrease consequences of DM by reducing glucose absorption, oxidative stress and increases insulin secretion, glucose tolerance, insulin sensitivity, glucose consumption and anti-oxidants activities.

Tannins: Tannins are a polyphenolic substance which are known to induce β cells and directly acts on adipose cells which enhances insulin activities. It also increases the glucose uptake through mediators of insulin signalling pathways.

Flavonoids: These are a group of hydroxylated phenolic substances. One good example of flavonoid present in Jamun is the Quercetin. It inhibits the process of oxidation and hence has antioxidant properties. It acts as a scavenger for free radicals which induces the oxidation process and are responsible for the oxidative chain reactions.

Phenols: Phenols have the potential anti-diabetic activities exhibited by the regulation of carbohydrate metabolism; improvement of glucose uptake enhance the protection of pancreatic - β -cells.

β –Sitosterol:

β –Sitosterol is the phytosterol compound which is found to be present in the seeds of *Syzygium cumini* and its chemical structure is similar to that of cholesterol. Under diabetes conditions, oxidative stress is produced which in turn causes tissue damage.

β –sitosterol reduces the tissue damage and also increases antioxidant levels.

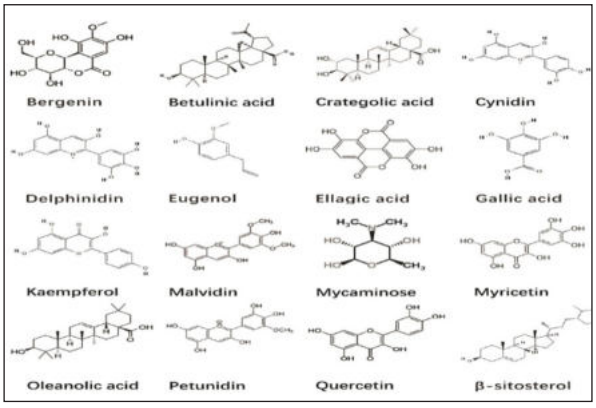

Figure 7 - Chemical structure of some important phytochemicals present in Jamun (Jagetia, 2017)

4.2 Phytochemical Components Of *Momordica Charantia*

The fundamental constituents of severe melon which are answerable for the antidiabetic impacts are triterpene, proteid, steroid, alkaloid, inorganic, lipid, and phenolic compounds[(Khalid Saeed *et al.*, 2010)(Budrat and Shotipruk, 2009)]. A few glycosides have been disconnected from the *M. charantia* stem and foods grown from the ground gathered under the genera of cucurbitane-type triterpenoids[(Chen *et al.*, 2017),(Tan *et al.*, 2008)]. Specifically, four triterpenoids have AMP-initiated protein kinase action which is a conceivable hypoglycaemic component of *M. charantia*[(Tan *et al.*, 2008)].

Figure 8 - The picture a and b show the morphological characteristics of *M.charantia.* A- leaf and flower, B- unripe fruits ©https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5751158/ (Jia *et al.*, 2017a)

M. charantia natural products comprise glycosides, saponins, alkaloids, lessening sugars, pitches, phenolic constituents, fixed oil and free acids[(Liu *et al.*, 2009)].

The organic product mash has dissolvable gelatin yet no free pectic acid. Examination has discovered that the leaves are nutritious wellsprings of calcium, magnesium, potassium, phosphorus and iron; both the consumable leafy foods leaves are incredible wellsprings of the B vitamins[(Ahmad *et al.*, 2012)].

Bioactive Compounds

In view of the huge number of ailments that severe melon can treat, researchers are increasingly more keen on considering its bioactive mixtures and their activities on the body. In any case, as numerous investigations report, there has been significant accentuation on the counter diabetic mixtures and their hypoglycemic properties[(Islam, Jalaluddin and Hettiarachchy, 2011),(Hazarika *et al.*, 2012)]. The significant mixtures that have been confined from bitter melon and recognized as hypoglycemic specialists incorporate charantin, polypeptide-p and vicine.

Polypeptide – p

Bitter melon is quite possibly the most usually utilized vegetable that contains polypeptide-p and is utilized to control diabetes naturally[(Joseph and Jini, 2013b)]. Polypeptide-p or p-insulin is an insulin-like hypoglycemic protein, appeared to bring down blood glucose levels in gerbils, langurs and people when infused subcutaneously[(Tsabang *et al.*, 2019)].

Vicine

The other significant compound that has been segregated from the seeds of unpleasant melon is a glycol alkaloid known as vicine[(Snelle *et al.*, 2019)]. This pyrimidine nucleoside has been appeared to incite hypoglycemia in non-diabetic fasting rodents by intraperitoneal administration[(Ahamad, Amin and Mir, 2015)].

5.1 Anti-inflammatory Activity

5.1.1 Anti-inflammatory Activity Of Jamun

Plant-inferred compounds with calming potential have been accounted for and their activities in a few pathophysiological conditions and illness models have been reported. This report states aftereffects of screening the watery seed extricate (ASE) of *Syzygium cumini* for calming properties, explicitly zeroing in on (Ezekiel et al. 2015) hindrance of fMLP-actuated neutrophil chemotaxis. Of significance, huge restraint of chemotaxis was seen at extremely low dosages of *S.cumini* seed removed.

Isolation of Human Neutrophils: Heparinized venous blood was gotten from typical solid human givers in the wake of accepting educated assent according to an affirmed Institutional Review Board convention. Neutrophils were separated by dextran sedimentation and Ficoll-Hypaque thickness angle centrifugation17. Later on, The study of anti-inflammatory activity has been made to seen the effects of *S.cumini* seeds also in wistar rats.(Kumar *et al.*, 2008)

5.1.2 Anti-inflammatory Activity Of M.charantia

Oral organization of 2% and 5% *M. charantia* dry powder essentially discouraged macrophage penetration in epididymal fat tissues (EAT) and earthy coloured fat tissues (BAT) of rodents took care of with high-fat eating routine (HFD), and downregulated the declaration of favourable to fiery cytokine monocyte chemotactic protein-1, TNF-α and IL-6 in EAT(Bao *et al.*, 2013). In any case, a contrary outcome was seen which is that harsh melon powder could essentially improve the favourable to fiery cytokines (TNF-α, IL-6) and mitigating cytokine (IL-10) by means of smothering the enactment of NF-κB flagging pathways(Bai, Zhu and Dong, 2016).

6. Anticancer Activity

6.1 Anticancer Activity Of Jamun

Malignant growth is a non-transmittable executioner infection, which is second just to cardiovascular sickness all things considered. Malignant growth is treated by a medical procedure, radiotherapy or chemotherapy or a mix of each (or all). In cutting edge stages, chemotherapy is the solitary solution for treat disease and, consequently, it has arisen as quite possibly the main modalities of malignancy treatment.

The cytotoxic impact of Jamun organic product skin unrefined concentrate was concentrated in HeLa (HPV-18 positive) cells and SiHa (HPV-16 positive) cells by MTT examine, and the rough concentrate was found to trigger a cytotoxic impact on both the cell types.

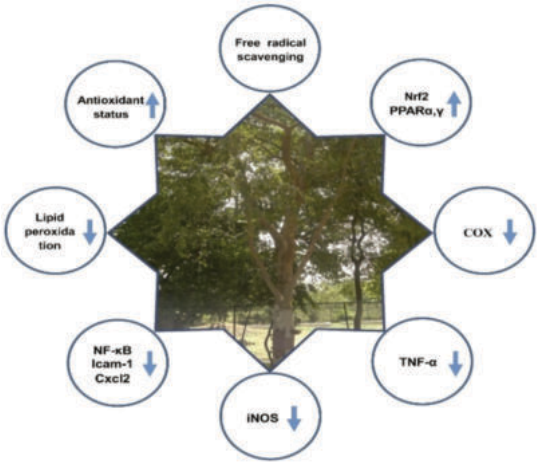

Figure 9 – Mechanism actions of Jamun(Archana, Ramasamy and Raj, 2012)

Free extreme enlistment has been shown in a few illness measures and the balance ofabundance free revolutionaries by Jamun might be one of the significant components of its activity, which is in accordance with reports of its capacity to rummage diverse free extremists.(Arun *et al.*, 2011)(Archana, Ramasamy and Raj, 2012).

6.2 Anticancer Activity Of Bitter Melon

M. charantia concentrate and its a few confined mixtures like momordin I, Id and I.e., α and β momorcharin and cucurbitacin B just as MAP 30-have shown anticancer action against lymphoid leukemia, lymphoma, choriocarcinoma, melanoma, breast disease, skin tumor, prostatic malignancy, squamous carcinoma of tongue and larynx, human bladder carcinomas and Hodgkin's infection (Licastro *et al.*, 1980)(Ng *et al.*, 1994)(Battelli *et al.*, 1996)(Ganguly, De and Das, 2000)(Sun *et al.*, 2001)(Basch, Gabardi and Ulbricht, 2003)(Hwang *et al.*, 2005)(Takemoto *et al.*, 1982).Bitter melon has also played a major role in breast cancer, colon cancer, pancreatic cancer, liver cancer, prostate cancer, skin cancer, leukemia and so on.

Colon cancer: In a recent research, Kwatra et al. have assessed the viability of methanolic concentrates of MC on colon disease stem and ancestor cells. Both entire leafy foods skin separates show huge restraint of cell multiplication and settlement development, with entire natural product has higher adequacy. The cells are captured at the S-period of cell cycle.

The entire organic product initiates the cleavage of LC3B, yet not caspase, recommending that the cells are going through autophagy, not apoptosis.

Wound healing activity : A progression of irregularities like disabled safe reaction and neovascularization, development factor lacks and diminished blend of collagen are related with diabetes and to the deferred wound recuperating (Singer and Clark, 1999). Treatment with *M. charantia* organic product balm could essentially improve twisted conclusion in diabetic rodents, and upregulate TGF-β articulation in injury tissue, which plays an significant part in managing cell development and separation (Hussan *et al.*, 2014).

7. CONCLUSION

On the whole, it can be concluded that the seeds *Syzygium cumini* is found to contain various medicinal properties and used as a traditional medicine.*Syzygium cumini* were reported they are antioxidant, Neuro-psycho pharmacological, anti-inflammatory, antifungal, anti-diarrheal, anti-fertility, gastro protective, anti-microbial, anti-bacterial and other radio protective activities.The juices and the fruit also were reported in treating other diseases except DM. In bitter melon, the biological components are the main investigation to show the in vivo hypoglycemic action of the significant mixtures of unpleasant melon was finished by a gathering of Japanese researchers. Not only in humans, the construction of three cucurbitane triterpenoids were resolved, just as two other significant mixtures that were tried and appeared to fundamentally bring down blood glucose levels in diabetic mice.

Taken together, the seeds of jamun and bitter melon undergoes various mechanisms to bring glycemic control but the exact mechanism that is responsible for anti-diabetic action and mode of action is not analyzed and explained yet.

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