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IN VITRO SCREENING OF EPI PREMNUM AUREUM FOR ANTI DIABETIC ACTIVITY

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ABSTRACT

Hyperglycemia is a chronic metabolic dysfunction that characterizes diabetes mellitus arising from disordered insulin secretions or actions or both. The aim of this study was to examine the anti-diabetic potential of E. Aureum, a popular ornamental plant. The stems and roots of E. Aureum were collected, verified and then extracted with petroleum ether and methanol solvents. Phytochemical screening and α-amylase inhibition assay in vitro were done on the extracts. Phytochemical analysis showed the presence of some bioactive compounds such as glycosides, terpenoids alkaloids phenolic compounds among other flavonoids too. The methanolic extract exhibited significant α-amylase inhibitory activity with its percentage inhibition ranging between 50.74-66.41 % at different concentrations (20-80 µg/mL). These findings indicate that E. Aureum extracts may possess antidiabetic potentials by inhibiting α-amylase which is responsible for carbohydrate digestion and glucose metabolism. This calls for more tests to be done in order to determine how these extract works against diabetes mellitus through antidiabetic activities as well as their therapeutic values in human beings suffering from diabetes mellitus.

KEYWORDS: Epipremnum aureum, diabetes mellitus, antidiabetic activity, α-amylase inhibition, phytochemicals, in vitro screening.

INTRODUCTION

A class of metabolic illnesses known as diabetes mellitus are brought on by hyperglycemia that is brought on by an infraction of insulin activity, secretion, or both. The significance of

insulin as an anabolic hormone account for the variations in the metabolism of proteins, lipids, and carbohydrates. Insulin resistance and associated metabolic anomalies are the causes of low insulin levels, which allow an acceptable response at the level of insulin, signals, and enzymes or genes in target tissues (mostly skeletal muscle, adipose tissue, and to a lesser extent, liver). The kind and duration of diabetes determine how severe the symptoms are. In the early stages of the disease, some individuals with diabetes—particularly those with type 2 diabetes—have no symptoms, while others—particularly children—have noticeable hyperglycemia. Polyuria, polydipsia, bulimia, weight loss, and blurred vision can all be symptoms of an insulin shortage. Uncontrolled diabetes can cause death from either the uncommon non-ketotic hyperosmolar syndrome or ketoacidosis if treatment is not received.

A condition known as diabetes is brought on by excessively high blood sugar levels. The energy source for the body is glucose. Although sugar can also be produced by our bodies, sugar is also found in the food we eat. The pancreas secretes insulin, a chemical that facilitates the entry of glucose into cells to produce energy. Your body either cannot utilise insulin correctly or does not create enough of it if you have diabetes. After that, the sugar does not enter the cells; instead, it stays in the blood. Diabetes raises the risk of damage to the kidneys, heart, nerves, and eyes. Certain cancers have also been connected to diabetes. Your chance of acquiring diabetes is decreased by taking action to avoid or manage it.

Epidemiology

In 2011, there were over 366 million cases of diabetes worldwide. This figure is expected to rise to 552 million by 2030. Every country is seeing a rise in the number of persons with type 2 diabetes, with low- and middle-income nations housing 80% of the global diabetes population. Diabetes was the cause of 4.6 million fatalities in 2011. By 2030, 439 million individuals worldwide are expected to have type 2 diabetes. Type 2 diabetes is more common in some regions than others, and it is influenced by lifestyle and environmental factors. Everything is frightful. Over the next 20 years, there will be a rise in the incidence of type 2 diabetes in adults, with the majority of cases occurring in emerging nations and affecting people between the ages of 45 and 64. The latter should be at least as high as the former in emerging nations, and they both contribute to the present shift in diseases from infectious to non-communicable.

Types

Diabetes is described as follows:

1) Insulin - dependent diabetes (type 1 IDDM)

Formerly known as juvenile-onset or ketosis-prone diabetes, this kind of diabetes is also referred to as autoimmune diabetes. Other autoimmune disorders like Addison's disease, Hashimoto's thyroiditis, and Graves' disease may also be treated by patients. Insulin-dependent diabetes mellitus (IDDM), also referred to as type I diabetes, is a fast-acting and potentially fatal condition that primarily affects children and adolescents. Insulin antibodies, which are autoimmune mechanisms known to induce anti-glutamate decarboxylase, islet cell, or β-cell death, are typically the cause of type 1. Type 1 diabetes (often brought on by a lack of insulin as a result of B cell damage). The rate at which beta cell damage occurs varies greatly; in certain individuals, it may occur rapidly, while in others, it may occur gradually. Insulin production becomes inadequate or non-existent as a result of the beta islet cells of the pancreas being destroyed. Insulin shots are necessary. 85–90% of individuals with type 1 diabetes have bodily damage markers, such as islet cell autoantibodies, insulin autoantibodies, and glutamic acid decarboxylase (GAD) autoantibodies, when early diabetic hyperglycemia is identified. Although the precise origin of diabetes is still unknown, there is evidence that antibodies that kill beta islet cells are part of the autoimmune mechanism in most cases of the disease.

2) Insulin Independent Diabetes Mellitus (NIDDM type 2)

Adult-onset diabetes is another name for type 2 diabetes. It's a condition where insulin resistance leads to increasing abnormalities in insulin secretion. Individuals who have this kind of diabetes frequently develop an immunity to the effects of insulin. Both forms of diabetes have long-term problems with the kidneys, eyes, nerves, and blood vessels, which are a primary cause of diabetes-related morbidity and death. The reason is multifaceted: these patients are at a heightened risk of having both macro vascular and microvascular issues due to obesity, a sedentary lifestyle, aging (which applies to middle-aged and older individuals), genetic factors, etc.

3) Gestational diabetes

Gestational diabetes mellitus is the term for glucose intolerance that develops or is identified during pregnancy (GDM). Gestational diabetes mellitus (GDM) is the term used to describe women who have type 1 diabetes throughout pregnancy or type 2 diabetes that is untreated and asymptomatic during pregnancy. Diabetes mellitus diagnosed during pregnancy but without overt indications of the disease is known as gestational diabetes mellitus, or GDM. It

is possible for gestational diabetes to develop during pregnancy and go away after delivery. Because of the impact of prenatal exposure to hyperglycemia, children born to mothers with GDM are at a higher risk of acquiring type 2 diabetes and obesity later in life.

4) Other specific types (monogenic type)

Hepatocyte nuclear factor (HNF)-1a, a liver transcription factor located on chromosome 12, is typically altered in monogenic type diabetes. These are also known as beta cell genetic abnormalities. This kind of diabetes is typically brought on by high blood sugar that first appears early in life, usually before the age of 25. These conditions are also known as adult-onset diabetes in the young (MODY), adult-onset diabetes in the young, or insulin resistance; exocrine pancreas diseases, such as cystic fibrosis or pancreatitis; diseases linked to other endocrine diseases, like acromegaly; and patients with diseases, medications, or drug-induced pancreatic dysfunction. Certain drugs are also administered in conjunction with HIV/AIDS therapy or following organ donation. Some families have been identified to have genetic defects that result in the inability to convert proinsulin to insulin; these features are inherited in a somatic chromosomal dominant pattern. Less than 10% of diabetes patients are them.

Etiology

Etiology of diabetes.

1) The word etiology is derived from the Greek word “aetiologia”.
2) In etiology we find the causes and origins of disease.
3) Bacteria may also play a role in the etiology of diabetes, such as coxsackie type B diabetes.
4) Both mumps and German morbillivirus have been shown to cause morphological changes in islet cell models.
5) The role of genetics in diabetes complications. It is possible that genetic factors may make a person's pancreas susceptible.

Pathogenesis

Insulin levels and the body's utilization of insulin are linked to the pathophysiology of diabetes. Type 2 diabetics have tissues that are resistant to insulin, but type 1 diabetics lack insulin. In a healthy state, the pancreatic beta cells release insulin to ward off diabetes. Sugar is always necessary for the brain to function correctly. Insulin and other oral hypoglycemic drugs are among the diabetic medicines that frequently result in hypoglycaemia. Plasma glucose concentrations play a role in the pathogenesis of diabetes by inducing the central

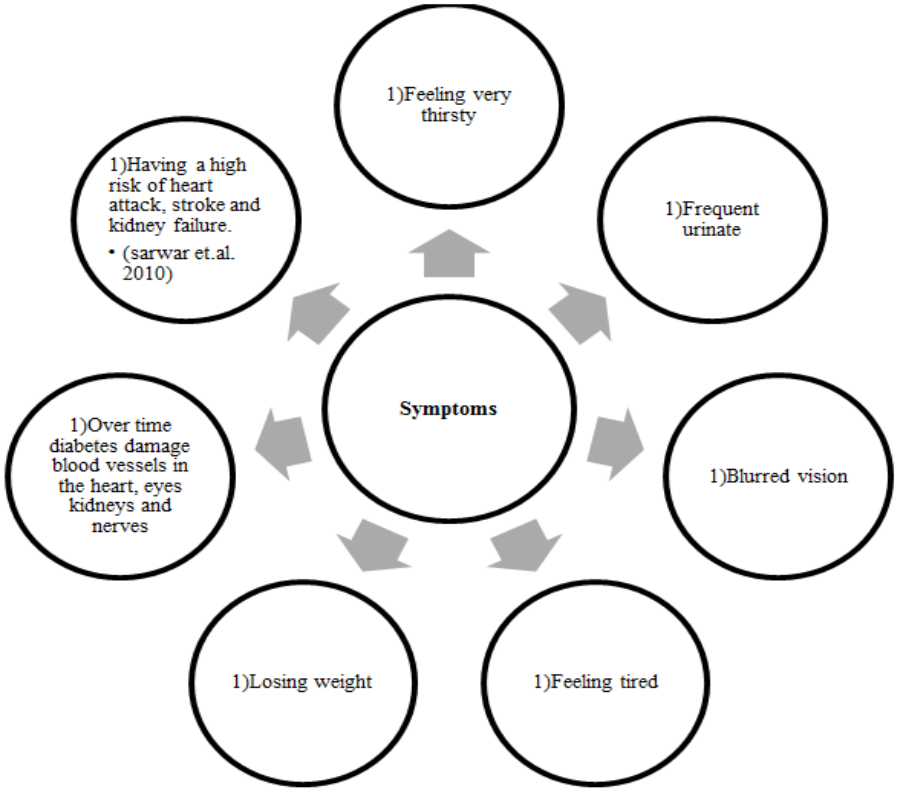
nervous system to release stored energy. depends on arterial plasma glucose, decreased blood glucose, cerebral blood flow, tissue integrity, and other fuel metabolic factors. Hypoglycaemia impairs the nervous system's ability to function. Finding low blood sugar levels in the blood is necessary for the diagnosis of hypoglycaemia. Consuming sugar is the quick fix. Hypoglycaemia can cause a variety of reactions, including reduced insulin production, an increase in the release of hormones that counteract glucose, such as glucagon and epinephrine, a stronger sympathetic nervous system response, associated symptoms, and, in the worst cases, coma, seizures, or cognitive failure. In certain patients with poor glucose tolerance or early-stage type 1 or type 2 diabetes, late hypoglycaemia of occult diabetes may develop. Following a meal heavy in carbohydrates, the patient has hypoglycaemia.

Causes of Diabetes Mellitus

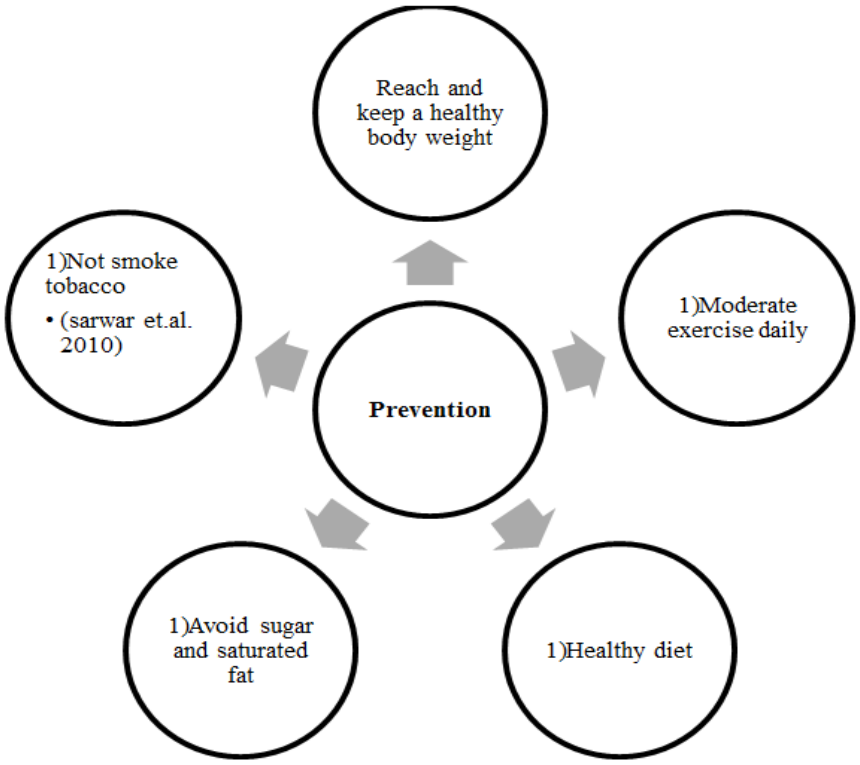
A problem or anomaly with the beta cell's glucose receptors that makes them react to elevated glucose levels or a relative lack of beta cells. Insulin secretion is compromised in any event. Could develop into malfunction of β-cells. Fundamental understanding of how hyperglycemia directly affects neuronal metabolism and how microvascular illnesses cause neuronal hypoxia.

1. Decreased insulin sensitivity in peripheral tissues: fewer insulin receptors exist; these receptors are "down regulated"
2. Many people have normal blood sugar levels but hypersensitivity and hyperinsulinemia. Abdominal obesity, hyperuricemia, and dyslipidaemia accompany it. As a result, there is relative insulin resistance, particularly in the levels of fat, muscle, and liver. Vasculopathy can be caused by hyperinsulinemia.
3. Relative insulin insufficiency and beta cell stagnation are brought on by excessive obesity, which also includes elevated blood sugar hormone (glucagon) levels. Other uncommon types of diabetes include adult-onset diabetes mellitus (MODY), gestational diabetes mellitus (GDM), certain endocrine disorders, and pancreatectomy, which are all brought on by specific genetic flaws (type 3).
4. It's possible that an imbalance in certain receptors leads to diabetes. The dipeptidyl peptidase IV enzyme, beta3 receptor (β3), α-glycosidase, peroxisome proliferator-activated receptor (γ) (PPARγ), and the glucagon-like peptide-1 (GLP-1) receptor are a few examples of particular receptors.
5. Presently, oxidative stress, polyol pathways, protein kinase C, and advanced glycation end products are the main areas of study for diabetic neuropathy.

Signs and symptom



Preventive measure



Diagnosis

A low blood pressure test can help with an early diagnosis. Insulin shots are necessary for people with type 1 diabetes to survive. Eating a balanced diet is one of the most significant methods to treat diabetes. Medication is sometimes necessary for type 2 diabetics in order to assist control their blood sugar. Injections of insulin or other drugs may fall under this category. Examples include metformin, derivatives of sulfonylurea, and inhibitors of the sodium-glucose cotransporter type 2 (SGLT-2). People with diabetes frequently require statins to prevent complications and drugs to lower blood pressure in addition to blood sugar-lowering ones. Treatment for the consequences of diabetes could involve further measures. Examination and treatment of kidney problems; foot care for ulcers; eye examination for retinopathy (inducing blindness).

Treatment

Oral Antidiabetic drugs

Enhance insulin secretion

Meglitinides

- Repaglinide
- Nateglinide

Sulfonylureas

- Glipizide
- Glimepiride
- Glyburide
- Gliclazide
- Glibenclamide
- Tolbutamide

Dipeptidyl-peptidase 4 (DPP-4) inhibitors

- Saxagliptin
- Sitagliptin
- Linagliptin
- Alogliptin
- Teneligliptin
- Vildagliptin

Overcome insulin resistance

Biguanides

- Metformin

Thiazolidinedione's

- Rosiglitazone
- Pioglitazone

Retard carbohydrate absorption

Alpha-glucosidase inhibitors

- Acarbose
- Miglitol
- Voglibose

Miscellaneous drugs

Sodium-glucose transporter 2 (SGLT2) inhibitors

- Canagliflozin
- Dapagliflozin
- Empagliflozin
- Ertugliflozin

Dopamine D2 agonist

- Bromocriptine

Why Herbs Are Used

- Herbs are historically utilized medicinal herbs that are used to treat problems specific to the area. These goods are concoctions of organic compounds that can be made in-house or from raw sources. Mission: To bring modern medicine back into the mainstream, popularize it, and inform the public that it is not a unique drug that comes with a high price. The majority of health food and grocery stores provide Chapter Allergy Tea, so you can obtain it without a prescription before making a purchase. This eliminates the need for additional medical expenses and makes it quite simple to obtain herbal products. In order to make, sell, and market goods without involving the FDA, teach them how to eat. Even though this makes buying and using these gadgets simpler, it is still our responsibility as customers to select the best options. Herbs are used to treat a wide range

of conditions, including acute and chronic pain as well as more serious issues like depression, heart illness, prostate issues, discomfort, and physical handicap. Numerous studies have demonstrated the efficacy of using medicinal plants to heal illnesses and afflictions, which are practiced worldwide. The fact that herbs have no negative side effects is one of their best qualities. They frequently have long-term advantages for general health. Herbs carry some risk as well. Furthermore, an increasing amount of scientific studies demonstrates the therapeutic benefits of herbs for specific illnesses and ailments.

MEDICINAL PLANT AND THEIR USES

Numerous herbal treatments are available for diabetes and its aftereffects. The primary ingredients in these concoctions are medicinal herbs. List of therapeutic herbs that have anti-diabetic properties.

Plants

- Acacia arabica: (Babhul)
- Aegle marmelos: (Bengal Quince, Bel or Bilva)
- Allium cepa: (onion)
- Allium sativum: (garlic)
- Aloe vera and Aloe barbadensis
- Azadirachta indica: (Neem)
- Caesalpinia bonducella
- Capparis decidua
- Coccinia indica
- Eugenia jambolana: (Indian gooseberry, jamun)
- Mangifera indica: (Mango)
- Momordica charantia: (bitter gourd)
- Ocimum sanctum: (holy basil)
- Phyllanthus amarus: (bhuiawala)
- Pterocarpus marsupium
- Trigonella foenum graecum: (fenugreek)
- Tinospora cordifolia: (Guduchi)

Herbal Drug Formulation

Patients with diabetes frequently use a variety of formulations available on the market, following their doctors' recommendations.

White mulberry (morus alba L.): The two primary components of white mulberry (Morus alba L.) that are responsible for its antidiabetic benefits are morin and 1.5-dideoxy-1.5-imino-D-sorbitol (DNJ). By blocking the enzymes α-amylase and α-glucosidase, which are vital for the breakdown of carbohydrates, DNJ performs a critical function in lowering blood glucose levels. In addition to its antioxidant and hypolipidemic qualities, this chemical supports metabolic health. White mulberry also contains a noteworthy chemical called morin, which has anti-inflammatory and antioxidant properties as well as improving insulin sensitivity. Numerous research have shown that White mulberry has the potential to be used as a natural treatment for diabetes because of these combined mechanisms.

Ceylon Cinnamon (cinnamonum zeylanicum): Because of a number of important components, Ceylon cinnamon (Cinnamomum zeylanicum J.Presl) possesses strong antidiabetic properties. It is well known that methylhydroxychalcone polymer helps regulate blood sugar by raising plasma insulin levels, exhibiting hypoglycemic and hypocholesterolemic effects, and stimulating adipocytes' uptake of glucose. According to reports cinnamon aldehyde improves insulin sensitivity and has hypoglycemic properties. In addition to its hypoglycemic effects, eugenol has anti-inflammatory and antioxidant qualities. Together, these substances enhance Ceylon cinnamon's capacity to treat diabetes.

Common bean (phaseolus vulgaris L.): (Phaseolus vulgaris L.) Common Bean Phaseolamin, a chemical found in common beans (Phaseolus vulgaris L.), is known to have antidiabetic activities. Phaseolamin reduces glucose absorption by blocking the enzyme α-amylase, which aids in the digestion of carbohydrates, and hence has hypoglycaemic effects. It also has hypolipidemic and antioxidant qualities, which help regulate diabetes and promote metabolic health.

Ginger zingiber (officnale Rosc.): The active ingredients in ginger (Zingiber officinale Rosc.), shogaol and gingerol, are known to have antidiabetic properties. It has been demonstrated that sogaol raises insulin and lowers fasting glucose. Gingerol enhances insulin sensitivity, which further contributes to these benefits. Strong anti-inflammatory and antioxidant characteristics of both substances bolster their potential for diabetic management.

Ginger can improve overall metabolic health and help control blood sugar levels through several processes.

Ginseng Panax (ginseng C.A Meyer): Panax ginseng, or ginseng (C.A. Meyer) Panax ginseng C.A. Meyer, the source of ginsenosides such Rg1, C-K, Rg3, and Rb1, is known for its antidiabetic properties and is highly recognized for its benefits. In addition to lowering blood glucose levels and reducing obesity, ginsenosides Rg1 also slows down the absorption of glucose and increases the expression of the glucose transporters GLUT-1 and GLUT-4. Ginsenosides C-K has anti-diabetic properties and increases insulin sensitivity. While ginsenoside Rb1 is recognized for its antioxidant, neuroprotective, and hypoglycemic qualities, ginsenosides Rg3 provides hypoglycemic and anti-inflammatory actions. When taken as a whole, these substances make ginseng a highly effective natural diabetes treatment.

The **'Himalaya'** brand of diabetes is said to boost glucagon levels in the liver and muscles, enhance peripheral glucose consumption, encourage B cell regeneration and repair, and raise C peptide levels.

Epicatechin, a benzopyran, is the active ingredient in epinsulin, which is marketed under the Swastik formula. Pancreatic islets' cAMP level rises in response to Epicatechin, and this is linked to an increase in insulin release. Through the activation of cathepsin, it contributes to the conversion of proinsulin into insulin. It is an effective supplement for lowering insulin resistance in people with insulin-dependent diabetes mellitus (IDDM) and has been documented for the treatment of diabetes mellitus, including non-insulin dependent diabetes mellitus (NIDDM).

Pancreas Tonic (Ayurvedic Herbal Supplements): Pancreas Tonic is a botanical blend of Indian Ayurvedic medicines now available as dietary supplements.

Bitter melon powder sold by Garry and Sun: - Lowers blood sugar and urine sugar. It improves the immune system and cleans the blood. Bitter melon is a folk remedy used especially in the treatment of diabetes.

Diabetes Daily Treatment: - Nature's Health Source makes a special kind of milk that is safe and effective in enhancing the metabolism of sugar. Type 2 diabetics are the target audience for Diabetes Daily CareTM.

Gurmar Powder: This anti-diabetic medication, made by Garry and Sun, stops sugar from entering the intestines and reduces blood sugar swings. Moreover, metabolic activity in the muscles, liver, and kidneys is linked to it. Gurmar reduces blood sugar and increases the synthesis of insulin.

DIABETA: Ayurvedic Treatment formula, which comes in capsule form, combines anti-diabetic medications with strong immunomodulators, anti-hyperlipidemic agents, anti-stress agents, and hepatoprotective compounds derived from plants.

Synedrex: Produced by Plethico Laboratory, is an extract from sprouted fenugreek seeds. Because of this, a wide variety of herbs are used either by themselves or in conjunction with other therapies to treat diabetes and its consequences. The lack of clarity surrounding the active components in this herb is one of its primary issues. Comprehending the active components and their molecular interactions is crucial for ascertaining the product's efficiency and adhering to its prescribed formula. Using model systems, attempts are being made to investigate the mechanisms of action of some of these plants.

Plant profile

Image no. 1: Epipremnum Aureum.

Epipremnum Aureum

Araceae family member Epipremnum aureum is indigenous to the French Polynesian island of Murua in the Society Islands. This species has naturalized in tropical and subtropical woods all over the world, including northern South Africa, Australia, Southeast Asia, South Asia, the Pacific Islands, and the West Indies, despite being a well-liked ornamental plant in cold climates. Goldenrod, Ceylon creeper, hunter's cloak, knife alum, household, money plant, act in India, Solomon Islands knife, marble queen, and taro vine are just a few of the common names for this plant. It is also known as "devil's wine" or "devil's knife" due to its

nearly invincible nature and ability to maintain its green hue even when stored in the dark. Shops selling plants may mislabel them as syndapse, pothos, or philodendron. In many regions of the Indian subcontinent, it is referred to as the Gold Factory. Seldom does it flourish without artificial hormones and vitamins.

The reason it's commonly referred to as the "devil's knife" is that it's nearly hard to kill and stays green even in the dark. The Royal Horticultural Society Garden Award went to this plant. This species starts its journey through taxonomy. The word "pothos" comes from the 1880 description that identified it as Pothos aureus. Because of its resemblance, it was included in Epipremnum pinnatum in 1962 and given the name Rhaphidophora aurea. It was taken out of E after a thorough examination of the growth and leaf pattern. pinnatum and Epipremnum aureum, the name it goes by now. Numerous species of Philodendron and Monstera. Podophyllum, or ivy.

Etymology

"Epipremnum" refers to the genus of trees, which support plant life. "Aurem" refers to the unique hue of the leaves and implies golden yellow.

Image no. 2: Epipremnum aureum.

Taxonomy

Kingdom : Plantae
Clade : Trichophytes’
Clade : Angiosperm
Clade : Monocots
Order : Alismatals
Family : Araceae
Genus : Epipremnum
Species : E. aureum

Binomial name: Epipremnum aureum
(Linden and Andre) G.S.Bunting 1964

Synonyms

1) Epipremnum mooreense
2) Pothos aureus
3) Rhaphidophora aurea
4) Scindapsus aureus

Common name

- Golden pothos
- Ceylon creeper
- Hunter's robe
- Ivy aureum
- Silver vine
- Solomon Islands ivy
- Taro vine
- Devil's vine or Devil's ivy
- Money plant

Plant attributes

Lifespan: Perennial
Plant type: Vine
Plant height: 20 cm
Spread: 30 cm to 6 m
Leaf colour: Yellow, green, variegated
Leaf type: evergreen

Description / Ethnobotany

Types of plant growth: Climbing vine and others
Mode of nutrition: Autotroph
Growth Type: - It is a creeping ascending branch with a maximum length of 12 meters.
Leaves: Typically, the leaves have a marbleized golden pattern. This plant features big yellow-white plants with larger leaves, as well as green, heart-shaped leaves that can reach a length of 10 centimetres. It is roughly 70 centimeters long.

Distribution locally: - Native to Southeast Asia, New Guinea, and the Solomon Islands. It is a common household item in cold climes and has naturalized in tropical and subtropical woods worldwide, including the Pacific Islands, the West Indies, South Africa, Australia, and Southeast and South Asia. It is lengthier in various nations.

Accommodations that are informative: - Above ground

Habitat: - It grows on tree branches with aerial roots at its original position, where it might become ground cover by absorbing into the soil.

Plants: Juveniles are grown as tiny houseplants, measuring approximately 15-20 cm. Larger or commercial plantations occasionally allow for the display of flora. Grow with moderate watering in partial shade. Cuttings can be used to propagate plants.

In terms of landscaping: - This vine grows well in hanging baskets used as interior gardens and vertical spaces.

Desirable plant characteristics: Ornamental leaves.

Chemical constituents

- Alkaloids
- Flavonoids
- Glycosides
- Sterols
- Terpenoids
- Fixed oil and fats
- Phytosterols
- Quinons
- Coumarin

Properties

- Air cleansing plant
- Decorative marbled leaves
- Growing in water filled bottle
- Indoor pollutant remover
- Toxic due to presence of calcium oxalates raphides

Poisoning

The eating of plants is the primary cause of poisoning. Youngsters under five years old. Plants claim the lives of animals. Toxicity: The ASPCA classifies this plant as "toxic to cats and toxic to dogs" because it contains insoluble calcium oxalate. One substance that crystallizes into needle-like shapes is calcium oxalate. It is expressed chemically as CaC2O4 or Ca2. Crystals made of calcium oxalate offer defence against ants, termites, and other pests. As a result, it functions well as a pesticide and influences calcium levels. The plant is toxic in all parts, and crystals of calcium oxalate are also toxic. It is important to make sure that animals do not consume vegetation. Mouth swelling, eye ache, tongue irritation, and vomiting are some of the symptoms.

Image no. 3: Epipremnum aureum.

Activities shown by Epipremnum aureum

Anti-inflammation

Pinnatum epipremnum (Linn.) Engl. When compared to the common medication Indomethacin, the anti-inflammatory efficacy of the aerial portions was assessed in Wistar albino rats, demonstrating a noteworthy suppression of carrageenan-induced rat paw oedema. The herb also has analgesic and anti-lipid peroxidation properties.

Antibacterial and antifungal: (leaves and aerial roots)

Different E. solvent extracts. It was discovered that aureum leaves and aerial roots had antibacterial activity against microbes.

When the aerial root fraction's aqueous extract was compared to the standard disc against the test organism in the descending order of Escherichia coli > Micrococcus luteus > Bacillus cereus > B, it revealed an exact and nearly equal zone of inhibition. Subtilis.[18] Methanolic extract from E. leaf. aureum demonstrated antimicrobial efficacy against Staphylococcus aureus and Escherichia coli, and antifungal activity against Candida albicans. Additionally, the ethyl extract of aerial roots was assessed.

Moreover, Rhaphidophora aurea, which is produced from Areca catechu, demonstrates antifungal and antibacterial properties. Ethanol, acetone, and petroleum ether extracts of E. aureum demonstrated considerable antimicrobial efficacy against E. Coli and S. aureus.

Termites (leaves)

For the first time, it has been reported that this plant's entire composition, but especially its ethanol-based root extract, is more disease-fighting. An investigation was carried out to show the Indian termite Odontotermes obesus the termitogenic effects of alkaloids obtained from Staphylococcus aureus in vitro. When compared to stems and roots, alkaloids extracted from leaves had the highest mortality rate. As such, we are in favor of the creation of herbal remedies utilizing these plants to address antibiotic-related issues. Chromatograms were also utilized in HPLC research to determine the presence of phenolic acids in herbal items and alcoholic beverages. Numerous peaks were found, and in the presence of uncommon samples, some of them were verified. Cinnamic acid and dihydroquercetin are typically present in both the leaf and the root of the golden eucalyptus plant. Only in plant roots were caffeineic acid, sinapic acid, and p-coumaric acid found.

Anti-cancer

Excextraits de chloroform from Epipremnum pinnatum (L.) Engl. shown a strong growth inhibition against T-47D breast cancer cells, and additional research on cell death processes revealed that the extract induced both planned cell deaths that were apoptotic and those that weren't.

Anti-oxidation: (aerial roots)

Testing the antioxidant activity of several solvent extracts from the aerial Higher antioxidant potential was demonstrated by extracts from Pothos aurea roots entwined over Lawsonia inermis and Areca catechu, as demonstrated by the 1, 1-diphenyl-2-picryl hydrazyl (DPPH) radical scavenging assay and the reducing power test. Because of its antioxidative qualities,

crude extracts of Epipremnum aureum's leaves and aerial roots have also been employed. The plant's leaf extracts demonstrated positive results for peroxidase (PX), superoxide dismutase (SOD), and catalase (CAT) activities, which have industrial applications and may have potential therapeutic benefits.

Detoxification: (stem)

To effectively remove formaldehyde, plants like golden pothos are the best choice. Carbon dioxide and benzene have been discovered to be effectively removed by it. Potential for air pollution to cause detoxification. Epipremnum aureum absorption of nicotine from leaf surface without mesophyll penetration. It is derived from E's origins. aureum. Despite not being able to produce nicotine, Epipremnum aureum roots are supplied nicotine exogenously, which is a xenobiotic. Thus, E. In addition to being able to detoxify formaldehyde and nicotine, aureum can be utilized in self-regenerating bio-filter systems that clean the air within buildings.

Cytotoxicity

Examining the antibacterial and cytotoxic properties of aqueous, ethanolic, and acetone extracts from several Escherichia coli plants against human hepatoma cell lines. In vitro cytotoxicity against the human hepatoma cell line (HEPG-2) was most active when acetone extract was used.

CNS Depressant and Diuretic Effects: - (Leaf)

On test animals, researchers assessed the diuretic and locomotor effects of alcoholic and aqueous leaf extracts. The reduction in locomotor activity and diuretic effects caused central nervous system depression in rats, according to the results.

Gastro protective and anti-inflammatory: - (stem)

The ethanolic extract of E was assessed in this investigation. aureum stem in a stomach ulcer model linked to the administration of oral extract and ethanol at dosages of 100, 200, and 400 mg/kbw. The benchmarks for the ethanol- and pylorus-induced models were sucralfate and omeprazole, respectively. With a maximal gastro protection of 73.94% in the ethanol-treated mouse, the extract demonstrated a significant ($p<0.05$) dose-dependent decrease in the gastric index, in contrast to 87.9% with sucralfate at 400 mg/kg. Omeprazole, at doses of 200 and 400 mg/kg, significantly decreased gastric pH, gastric volume, ulcer index, free acid, and acidity in the pylorus-ligated model by 81.5%. The findings demonstrated antiulcer and

gastro protective properties, suggesting their possible application in phyto-antiulcer formulations.

Toxicological studies: - (Leaves)

This work assessed the acute and sub chronic toxicity in Sprague Dawley rats of leaf extracts given orally.

Antidiabetic: (leaves)

An investigation assessed the antidiabetic potential of many E. aureum leaf extracts in diabetic rats treated with streptozotocin (STZ). In STZ-rats, there was a significant drop in serum glucose, total cholesterol, triglycerides, liver enzymes, bilirubin, urea, uric acid, creatinine, and total protein; yet, there was a large rise in SOD and GSH antioxidant levels. When the ethanol extract was used instead of the chloroform and acetone extracts, the outcomes were more successful.

Wound care: (leaves)

This study assessed the ability of an ointment formulation containing a methanol-rich extract of E. to heal wounds. aureum leaves utilizing rabbit wound models—both incisional and excisional. The outcomes demonstrate how quickly wounds heal.

Phytoremediation of formaldehyde: - (Stem)

The plant Epipremnum aureum is prized for its ability to effectively remove formaldehyde from the air. The effectiveness of the stem is unknown, despite the fact that the plant's underground and aerial portions have demonstrated the potential to scavenge formaldehyde. For the purpose of formaldehyde fumigation, Epipremnum aureum and Rohdea japonica were placed in a sealed compartment. It is possible to separate the branch from the shape, according to the results.

Objective

- This research was done to assess how well epipremnum aureum root and stem extract to reduce diabetes mellitus. Many new drugs have developed after scientifically validating the traditional uses for a variety of plants that have been used to treat diabetes mellitus. However, there are still a large number of herbal and medicinal plants that need to be investigated and validated.
- To evaluate epipremnum aureum for antidiabetic potential.

Plan of work

In order to fulfil above objective the work was planned as follows:

- Collection, identification and authentication of stem and roots of epipremnum aureum, plant material.
- Extraction of plant material by using methanol by maceration process.
- Preliminary phytochemical screening of epipremnum aureum.
- Evaluation of epipremnum aureum plant extract in diabetes mellitus using in vitro model.
- Compilation of data

MATERIAL AND METHOD

Collection and authentication of plant

Plants are collected from local area of yavatmal and authenticated from the agriculture college of yavatmal. Stems are collected and washed properly with water and dried in shade. After drying, form coarse powder for maceration. Weight of the collected stem is 91 grams. Authentication No: PWCOP/358/Herbal Plant Specimen/12749-12751/2023-24.

Materials

Ether, Coarse powder of stem, methanol, sodium hydroxide (NaOH), sodium chloride (NaCl), sodium potassium tartrate, α amylase, dinitro salicylic acid (DNSA), Phosphate buffer.

Method

Extraction with ether

91gram coarse powder of stem of epipremnum aureum extracted in 1.5 litre of petrol for five days. After five days filtrate gets filtered. Leave for evaporation in the water bath. Obtained solid paste of petroleum extract.

Extraction with methanol

After filtration, the stems of epipremnum aureum are dried in shade. These stems are extracted with 1.5liter methanol. Store it for five days and the filtrate gets filtered. Leave the extracted methanol for evaporation. Obtained solid paste of methanolic extract, which is used in inhibition of α amylase.

Phytochemical screening

1) Alkaloids

- **Dragendorff's test**

Take a few ml filtrate and add 1-2 ml dragendorff's reagent in it. A reddish - brown precipitate is shown. Then the test is passed. Passed the test.

- **Hager's test**

Take a few ml filtrate and add 1-2 ml Hager's reagents. A creamy white precipitate will be shown. Passed the test.

- **Mayer's test**

Take a few ml of filtrate and add 1-2 drops of Wagner's reagent along the side of the test tube. A creamy white or yellow precipitate will be shown then the test is passed. Passed the test.

- **Wagner's test**

Take a few ml of filtrate and add 1-2 drops of Wagner's reagent along the side of the test tube. A brown reddish precipitate will be shown. Passed the test.

- **Iodine test**

Take a few ml extract solution and add a few drops of iodine solution. An orange colour is shown. Passed the test.

2) Glycosides

- **Keller - killani test**

Take 1 ml filtrate, add 1.5 ml glacial acetic acid, add 1 drop of 5% ferric chloride and concentrated H_2SO_4 along with the side of the test tube. If a blue coloured solution is seen in acetic acid layer then the test is positive. Passed the test.

- **Bromine water test**

Take plant extract and add a few ml of bromine water. A yellow precipitate will be shown. Passed the test.

3) Phenolic compound test

- **Iodine test**

Take 1 ml extract and add a few drops of dilute iodine solution. A transien reel color will be shown. Passed the test.

- **Gelatine test**

Take plant extract and dissolve it in 5 ml distilled water and add 3 ml of 10% lead acetate solution. Passed the test.

4) Phytosterols

- **Acetic anhydride test**

Take 0.5 ml plant extract, add 2 ml of acetic anhydride and add 2 ml concentrated H_2SO_4. Change in colour from violet to blue or green occurs. Passed the test.

- **Sulphur test**

Take an extract solution and add a pinch of sulphur powder if sulphur sinks to the bottom test will be the pass. Passed the test.

5) Terpenoids

- Take 2 ml of chloroform, add 5 ml of plant extract, evaporate in a water bath and add 3 ml concentrated h2so4. This solution was boiled in a water bath. A grey coloured solution will be seen. Passed the test.

6) Triterpenoids

- **Salkowski test**

Take filtrate and add a few drops of concentrated H_2SO_4.Shake the test tube well and allow it to stand. Golden yellow layer will appear at the bottom. Passed the test.

7) Flavonoids

- **Alkaline reagent test**

1 ml extract adds 2 ml of 2% NaOH solution and adds a few drops to dilute HCl. An intense yellow colour becomes colourless in addition to diluted acid. Passed the test.

- **Lead acetate test**

Take 1 ml plant extract and add a few drops of 10% lead acetate solution. A yellow colour precipitate will be shown. Passed the test.

- **Ferric chloride test**

Take extract aqueous solution and add a few drops of 10% ferric chloride solution. A green precipitate will occur. Passed the test.

- **Ammonia test**

Take filtrate, add 5 ml dilute ammonium solution and add concentrated H_2SO_4. A Yellow colour will appear. Passed the test.

- **Concentrated H_2SO_4 test**

Take plant extract and add concentrated H_2SO_4 in it. An orange colour will appear. Passed the test.

Inhibition of α amylase

1) Test sample 600 ul of 20, 40, 60, 80 ug/ml.
2) 1.2 ml of starch in phosphate buffer (pH 6.9) containing 6.7mM of sodium chloride are added.
3) The reaction is initiated by adding 600 ul porcine pancreatic amylase and incubated at 37°c.
4) From the above mixture 600 ul is taken and 300 ul of DNSA (1 g of DNSA + 30 g of sodium potassium tartrate + 20 ml of 2N sodium hydroxide was added and made up to a final volume of 100 ml with distilled water) and is kept in boiling water bath for 15minute.
5) The reaction mixture diluted with 2.7 ml of water and absorbance is read at 540 nm.
6) For each concentration blank tube are prepared by replacing the enzyme solution with 600 ul in distilled water.
7) Control, representing 100% enzyme activities, are prepared in a similar manner without a test sample.
8) The α amylase inhibitory activities were calculated by using the formula.

$$\text{Inhibition \%} = \frac{\text{Abs 540 nm (control)} - \text{Abs 540 nm (drug sample)}}{\text{Abs. 540 nm (control)}} \times 100$$

OBSERVATION AND CALCULATION

Calculation

For 20 ug/ml

Control = 0.540

Test = 0.266

$$\text{Inhibition \%} = \frac{\text{Abs 540 nm (control)} - \text{Abs 540 nm (drug sample)}}{\text{Abs. 540 nm (control)}} \times 100$$

$$\frac{0.540 - 0.266}{0.540} \times 100$$

= 50.74%

For 40 ug/ml

Control = 0.976

Test = 0.362

$$\text{Inhibition \%} = \frac{\text{Abs 540 nm (control)} - \text{Abs 540 nm (drug sample)}}{\text{Abs. 540 nm (control)}} \times 100$$

$$\frac{0.976 - 0.362}{0.976} \times 100$$

= 62.68%

For 60 ug/ml

Control = 1.235

Test = 0.444

$$\text{Inhibition \%} = \frac{\text{Abs 540 nm (control)} - \text{Abs 540 nm (drug sample)}}{\text{Abs. 540 nm (control)}} \times 100$$

$$\frac{1.235 - 0.444}{1.235} \times 100$$

= 64.04%

For 80 ug/ml

Control = 1.581

Test = 0.531

$$\text{Inhibition \%} = \frac{\text{Abs 540 nm (control)} - \text{Abs 540 nm (drug sample)}}{\text{Abs. 540 nm (control)}} \times 100$$

$$\frac{1.581 - 0.531}{1.581} \times 100$$

= 66.41%

OBSERVATION TABLE

Table No. 1: Inhibition activity (%) of methanolic extract of epipremnum aureum stem against α-amylase.

Sr.no.	Concentration (ug/ml)	Control	Test	Inhibition (%)
1.	20 ug/ml	0.540	0.266	50.74 %
2.	40 ug/ml	0.976	0.362	62.68 %
3.	60 ug/ml	1.235	0.444	64.04 %
4.	80 ug/ml	1.581	0.531	66.41 %

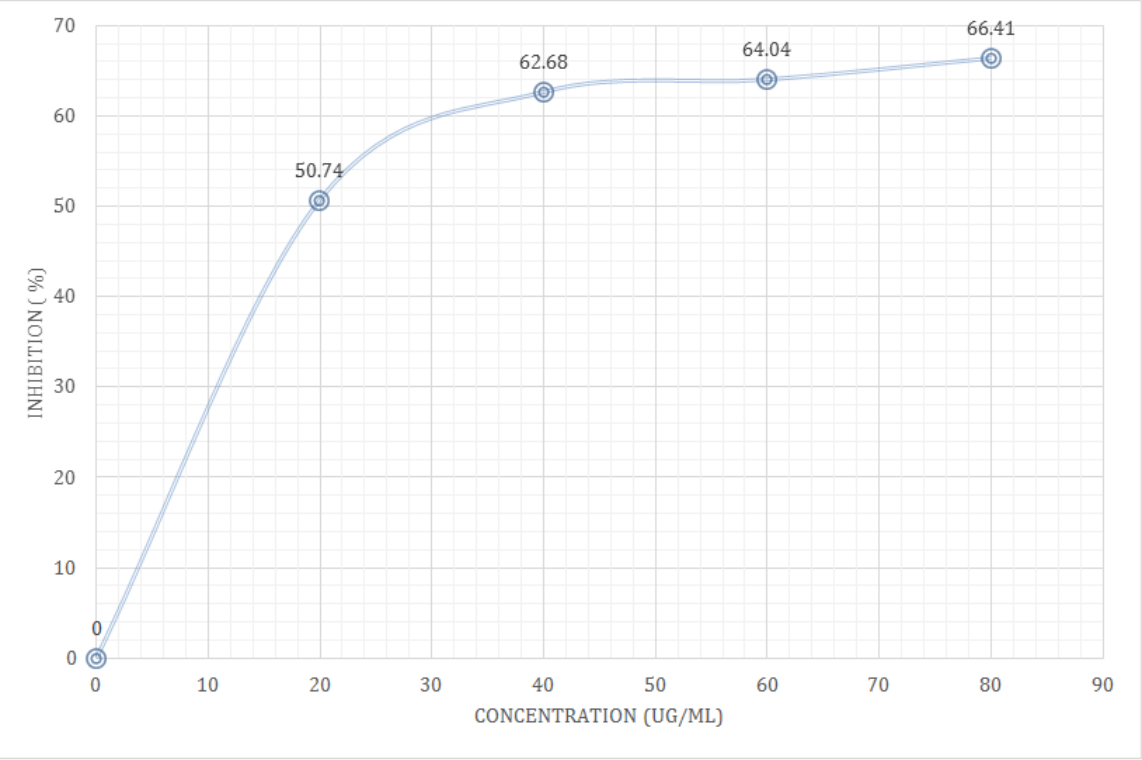


Figure no. 1: Absorbance effect of methanolic extract of epipremnum aureum stem on in-vitro antidiabetic activity.

RESULT

The phytochemical screening tests showed positive results for alkaloids, glycosides, phenolic compounds, Phytosterols, terpenoids, Triterpenoids, and flavonoids using various standard reagents. Each test confirmed the presence of these compounds through characteristic colour changes or precipitates.

Epipremnum aureum extracts demonstrated a significant inhibition of alpha-amylase activity at varying concentrations, with inhibition percentages ranging from 50.74% to 66.41% across concentrations 20 to 80 tested.

DISCUSSION

Diabetes mellitus is a group of metabolic disorders characterized by high blood sugar due to issues with insulin secretion, action, or both. Insulin is essential for regulating the metabolism of proteins, lipids, and carbohydrates by facilitating glucose uptake into cells. Type 1 diabetes results from autoimmune destruction of pancreatic beta cells, leading to an absolute insulin deficiency, requiring lifelong insulin therapy. Type 2 diabetes involves insulin resistance and relative insulin deficiency, often linked to obesity and inactivity.

Symptoms include frequent urination, excessive thirst, increased hunger, weight loss, and blurred vision. If untreated, diabetes can lead to serious complications such as diabetic ketoacidosis and hyperosmolar hyperglycemic state, as well as chronic issues like cardiovascular disease, kidney damage, nerve damage, and vision loss. Globally, diabetes affects millions, with numbers rising rapidly, especially in low- and middle-income countries. This rise poses significant health and economic challenges. Preventing type 2 diabetes involves lifestyle changes such as a healthy diet, regular exercise, and weight management. Effective management for diagnosed individuals includes monitoring blood glucose, using medications, and educating patients on self-care.

Understanding the various types of diabetes—type 1, type 2, gestational, and monogenic—is crucial for treatment and management. Public health strategies focusing on prevention, early detection, and management are vital to reduce the incidence and impact of diabetes, ultimately improving health outcomes and reducing healthcare costs.

Many people with normal blood glucose levels experience hyperinsulinemia and associated conditions like abdominal obesity, hyperuricemia, and dyslipidaemia. This state leads to relative insulin resistance and can cause vascular problems due to elevated insulin levels. Excessive obesity further exacerbates insulin insufficiency and beta cell dysfunction, often accompanied by high glucagon levels, which raise blood sugar. Other diabetes forms, such as MODY and gestational diabetes, often arise from specific genetic defects. An imbalance in certain receptors, like the dipeptidyl peptidase IV enzyme and glucagon-like peptide-1 receptor, can also contribute to diabetes. Research into diabetic neuropathy focuses on oxidative stress and other pathways that damage nerves. Effective diabetes management requires understanding these underlying mechanisms and continuing research into new treatment strategies.

Herbs have long been used for treating various ailments, offering effective and often side-effect-free alternatives to conventional medicine. Increasing scientific evidence supports their benefits, making them an accessible and cost-effective option for many health issues.

Epipremnum aureum, originally from the French Polynesian island of Murua, has spread to tropical and subtropical regions worldwide. Known by many names such as goldenrod, money plant, and devil's knife, this hardy plant is popular for its resilience and ability to stay green even in low light. Despite its ornamental appeal, it seldom thrives without artificial hormones and vitamins. Often mislabelled in stores, it has undergone several taxonomic changes, finally being recognized as Epipremnum aureum. Its name reflects the supportive nature of its genus and its distinctive golden leaves.

There are two models used for detection of antidiabetic activity are in vivo and in vitro models. We are using an In vitro model for our experiment.

In vitro studies, conducted in controlled laboratory settings outside of living organisms, offer valuable insights into biological mechanisms, drug effects, and disease processes. They allow researchers to manipulate experimental conditions precisely and screen a large number of compounds efficiently. However, their simplified model systems and lack of biological context require cautious interpretation and validation in animal models and clinical trials. Despite limitations, in vitro studies remain indispensable for advancing biomedical research and drug discovery, providing essential mechanistic insights and facilitating the development of novel therapeutic interventions.

The process of collecting and extracting compounds from Epipremnum aureum stems involves maceration with petrol and methanol, followed by evaporation to obtain solid extracts. These extracts are then utilized for inhibiting α amylase activity, a crucial step in starch digestion.

Phytochemical screening tests conducted on plant extracts, revealing the presence of various bioactive compounds. These tests, ranging from alkaloids to flavonoids, offer insights into the medicinal potential of the plant. Each test method and result are meticulously detailed, showcasing the diverse range of phytochemicals present. Such screenings are vital in assessing the therapeutic value of plants and guiding further research into their potential applications in medicine and healthcare.

The inhibition process involves testing various concentrations of the extract against porcine pancreatic amylase, followed by measuring absorbance at 540 nm. The α amylase inhibitory activities are calculated using a specific formula. This method provides a systematic approach to assess the potential therapeutic effects of Epipremnum aureum extracts in managing conditions related to starch metabolism

CONCLUSION

- The research suggests that by blocking alpha-amylase activity, which is essential for controlling diabetes mellitus, Epipremnum aureum extracts may have antidiabetic effects.
- The alpha-amylase inhibition that has been detected implies that these extracts could aid in glucose regulation, which makes them a good option for more study in antidiabetic therapy.

By demonstrating Epipremnum aureum's capacity to block important enzymes involved in glucose metabolism, this study offers important new insights into the plant's potential as a natural treatment for diabetes mellitus and presents a fresh strategy for managing the disease with herbal medicine.

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