Diabetes

Diabetes (medically known as *diabetes mellitus*) is the name given to disorders in which the body has trouble regulating its blood glucose, or blood sugar, levels. There are two major types of diabetes: type 1 and type 2. Type 1 diabetes, also called juvenile diabetes or insulin-dependent diabetes, is a disorder of the body's immune system — that is, its system for protecting itself from viruses, bacteria or any "foreign" substances. A third form of diabetes, called monogenic diabetes, is sometimes mistaken for type 1.

Type 1 diabetes occurs when the body's immune system attacks and destroys certain cells in the pancreas, an organ about the size of a hand that is located behind the lower part of the stomach. These cells — called beta cells — are contained, along with other types of cells, within small islands of endocrine cells called the pancreatic islets. Beta cells normally produce insulin , a hormone that helps the body move the glucose contained in food into cells throughout the body, which use it for energy. But when the beta cells are destroyed, no insulin can be produced, and the glucose stays in the blood instead, where it can cause serious damage to all the organ systems of the body.

For this reason, people with type 1 diabetes must take insulin in order to stay alive. This means undergoing multiple injections daily, or having insulin delivered through an insulin pump, and testing their blood sugar by pricking their fingers for blood six or more times a day. People with diabetes must also carefully balance their food intake and their exercise to regulate their blood sugar levels, in an attempt to avoid hypoglycemic (low blood sugar) and hyperglycemic (high blood sugar) reactions, which can be life threatening.

The warning signs of type 1 diabetes include extreme thirst; frequent urination; drowsiness or lethargy; sugar in urine; sudden vision changes; increased appetite; sudden weight loss; fruity, sweet, or wine-like odor on breath; heavy, labored breathing; stupor; and unconsciousness.

Generally, type 1 diabetes is diagnosed in children, teenagers, or young adults. Scientists do not yet know exactly what causes type 1 diabetes, but they believe that autoimmune, genetic, and environmental factors are involved.

Diabetes Complications

While insulin allows a person with type 1 diabetes to stay alive, it does not cure the disease, nor does it prevent the development of serious complications, which can be many and varied. High blood sugar levels eventually damage blood vessels, nerves, and organ systems in the body. Among the potential complications of type 1 diabetes are:

Cardiovascular disease

Cardiovascular disease, a range of blood vessel system diseases that includes both stroke and heart attack, is the major cause of death in people with diabetes. The two most common types of cardiovascular disease are coronary heart disease, caused by fatty deposits in the arteries that feed the heart, and hypertension, or high blood pressure. Research shows that people with diabetes are more likely to have high cholesterol and hypertension, both of which cause damage to the cells lining the artery walls. Researchers think high blood glucose contributes to both of these conditions.

Hypoglycemia

Hypoglycemia, low blood sugar, is a dangerous condition for people with diabetes. It can be triggered by not eating often enough, eating too little food, too much physical activity without eating, or too much insulin. People with diabetes can usually tell when their blood sugar is low. But the more episodes of hypoglycemia you have, the harder it gets for your body to detect the next episode. In severe forms, hypoglycemia can lead to unconsciousness or even death. For patients with type 1 diabetes, fear of hypoglycemia is a major obstacle to maintaining tight blood glucose control.

Nephropathy

Diabetic kidney disease, also known as diabetic nephropathy, is one of the most common and most devastating complications of diabetes. It is a slow deterioration of the kidneys and kidney function which, in severe cases, can eventually result in kidney failure, also known as end-stage renal disease, or ESRD. About one third of people with type 1 diabetes develop nephropathy.

Neuropathy

Neuropathy, or nerve damage, affects more than 60 percent of people with type 1 diabetes. The impact of nerve damage can range from slight inconvenience to major disability and even death. Diabetic neuropathy leads to loss of feeling and sometimes pain and weakness in the feet, legs, hands, and arms, and is the most common cause of amputations not caused by accident in the United States. In one type of neuropathy, known as autonomic neuropathy, high glucose levels injure the autonomic nervous system, which controls bodily functions such as breathing, circulation, urination, sexual function, temperature regulation, and digestion. Autonomic neuropathy may result in various types of digestive problems, diarrhea, erectile dysfunction, a rapid heartbeat, and low blood pressure.

Retinopathy

Diabetic retinopathy is the most common and serious eye-related complication of diabetes. It is a progressive disease that destroys small blood vessels in the retina, eventually causing vision problems. In its most advanced form (known as “proliferative retinopathy”) it can cause blindness. Nearly all people with type 1 diabetes show some symptoms of diabetic retinopathy, usually after about 20 years of living with diabetes; approximately 20 to 30 percent of them develop the advanced form.

EFFECT OF *COCCINIA INDICA* (L.) AND *ABROMA AUGUSTA* (L.) ON GLYCEMIA, LIPID PROFILE AND ON INDICATORS OF END -ORGAN DAMAGE IN STREPTOZOTOCIN INDUCED DIABETIC RATS.

ABSTRACT

In *Ayurvedic* system of medicine in India, not only extracts of one plant or the other but also a combination of plant extracts are used for the treatment of diabetes mellitus. The present paper reports the combined effect of *Abroma augusta* and ***Coccinia indica*** known to be useful for the treatment of diabetes in Ayurveda on the fasting blood sugar, glucose tolerance and lipid profile of Streptozotocin (STZ) induced albino rats. 300mg of water extract of the mixture of dried powdered roots of *A. augusta* and leaves of *C.* ***indica*** in equal proportions was given once daily for 8 weeks. After 8 weeks of treatment of Streptozotocin (STZ) diabetic rats, the fasting blood sugar came down to almost normal value and improvement in glucose tolerance and serum lipid profile were also observed.

KEY WORDS

Hypoglycaemic plants; *Abroma augusta*, ***Coccinia indica***; Streptozotocin (STZ), diabetes neuropathy.

Coccinia indica was obtained from Indian Agricultural Research Institute , Delhi. The roots of *A. augusta* and *C.* ***indica*** leaves were air dried and powdered in a grinder and mixed in equal proportions

Preparation of water extract :

150 gm of Powder mixture of the two plant parts was extracted overnight with 180 ml of water with magnetic stirring in cold room (4º C). The water extract was separated and the residue was re- extracted with water. The combined water extract was concentrated in lyophilizer.

Animals

Wistar albino rats were obtained from Centre for Cellular and Molecular Biology , Hyderabad clearance is taken from animal ethics committee (IEC). Adult rats of either sex weighing between 100-200 gms were selected for the study. The animals were acclimatized to laboratory conditions and divided into various groups. Animals were housed and kept on the light and dark cycle through out.

Induction of diabetes and associated neuropathy

Healthy adult albino wistar rats of both sexes weighing between 100-200 gm were obtained from the Centre for Cellular and Molecular Biology (CCMB), Hyderabad and used in this study. The animals were fed on a pellet diet (Hindistan Lever. India) and water provided *ad libitum*. Diabetes was experimentally induced to produce diabetic neuropathy (12 -13). Sorbitol induced dysfunction of inositol / metabolites leading to neuro- infarction. By causing microangiopathy of vasa nervosum it decreases blood flow to nerves . Over night fasting animals were injected with streptozotocin (STZ) (60 mg / kg dissolved in 3 mM citrate buffer (pH 4.5) intraperitoneally (i. p). After 10 days only those rats which showed plasma glucose levels > 300 mg / dl were classified as diabetic and were included in study as described earlier by our laboratory (14). Animals were divided into three groups of five each. Group 1 animals served as healthy controls, while those of the group 2 were untreated diabetic rats. Rats of group 3 were diabetic treated for 8 weeks with 300 mg of water extract of *A. augusta* plus

Coccinia indica. (13 – 14). Blood samples were collected from overnight fasted rats at 0 and 8 weeks. Blood glucose serum total cholesterol, HDL and LDL- cholesterol, triacylglyerol, and Glycosylated hemoglobin were determined using kits from Randox Mumbai. Total proteins albumin and creatinine in serum were determined by the method of Reinhold (15). Assay of plasma glucose and albumin and creatinine and total cholesterol, LDL-VLDL & HDL cholesterol and triglycerides were estimated as described earlier (12-16-17). Lipid peroxidation products were estimated as thiobarbituric acid reactive substance (TBARS) in plasma & tissues (16-17).

Statistical analysis:

All the data were statistically evaluated and the significance calculated using student's test. All the results were expressed as mean ± SD.

RESULTS AND DISSCUSSION

The results obtained with untreated diabetic rats and diabetic rats treated with *A. augusta* plus *C.* ***indica*** on fasting blood glucose and GTT are compared with normal healthy controls and shown in (Tables 1 and 1A). It is seen that treatment with water extract of *A. augusta* plus *C.****indica*** at a dose of 300mg / kg body wt brought down fasting blood glucose (Table1), from a higher value of 166.9 ±25.4 mg/dl to a normal value of 85.4±2.3 mg/dl while in the untreated group the FBG increased from the initial value of 172.2 ±5.4 to 285.6±42.6 mg/dl. There was considerable fall in FBG in diabetic rats treated with *A. augusta* alone or *C.* ***indica*** alone. The effect was more with *C.* ***indica***. But the effect of the two plants in combination was more than that with either of the plants alone. Similar improvement ±92.2 mg/dl even after 2 hrs of glucose load