ISSN No:-2456 –2165

In Vitro Evaluation of Alpha Amylase Activity of Bark Extracts of Ficus Auriculata

Yogesh Tiwari*, Amandeep Singh, Bhupendra Kumar, Ashok Kumar
Faculty of Pharmacy, Dev Bhoomi Institute of Pharmacy & Research, Dehradun
aman.arora12345@gmail.com

Abstract:- Diabetes mellitus is a metabolic disorder resulting in abnormal hyperglycemia. It can be caused by hereditary, poor diet, indigestion, obesity, modern lifestyle, mental & physical stress, infection in pancreas, hypertension, lipoproteins, less glucose utilization and several other factors. WHO estimates that more than 80% cases are is of diabetics. It is recognized by abnormal insulin secretion. In addition to drug therapy, it involves changes in lifestyle, such as improper diet and exercise also controlled. If the amount of alpha amylase in body is increased, then the glucose level increases in the body. If alpha amylase activity is reducing naturally and with influence of drugs then reduce the blood glucose level and show hypoglycemic activity (Ponnusamy, 2012).

Keywords:- Diabetus Mellitus, Alpha Amylase

I. INTRODUCTION

Diabetes is a major problem and is associated with multiple biochemical ruination. The exponential growth is observed with respect to diabetics, there is an expedition in identifying the newer health care strategies for the control of this complex disease. One of the most critical complications of diabetes is post prandial hyperglycaemia, and it can be managed by amylase inhibitors. Alpha amylase and alpha amylase inhibitors are the agents can be used for the treatment of diabetes, obesity and hyperlipemia. Majority of antidiabetic drugs available in the market are mainly act by stimulating the insulin absorption and its release from pancreas or by the inhibiting the enzymes such as α-amylase and α-glucosidase (carbohydrate degrading enzymes). Two major concerns in the usage of these drugs in the side effects caused and drug resistance after prolonged treatment. To identify the natural inhibitors of alpha amylases from plant based sources is now the primary concern of scientific research. To overcome these effects the search for scientifically approved and safe natural antidiabetic agents is also emphasized by the World Health Organisation. The present study is carried out by selecting the medicinal plant and evaluating for alpha amylase inhibition against porcine pancreatic alpha amylase using the substrate starch (Challa et al., 2013).

II. PLANT PROFILE

Biological source: Ficus auriculata
Family: Moraceae

Chemical Constituents: It contains various chemical such as betulinic acid, lupeol, stigmasterol, bergapten, scopoletin, β-sitosteril-3-o-β-D- glucopyranoside, myricetin and querecetin-3-o-β-D-glucopyranoside. And other chemicals present are alkaloids, carbohydrates, saponins, glycosides, phytosterols, resins, phenols, tannins, diterpenes, flavonoids and proteins (Zayed et al., 2011).

Fig. No. 1: Leaves and Bark of Plant Ficus Auriculata (Timal).

ISSN No:-2456 –2165

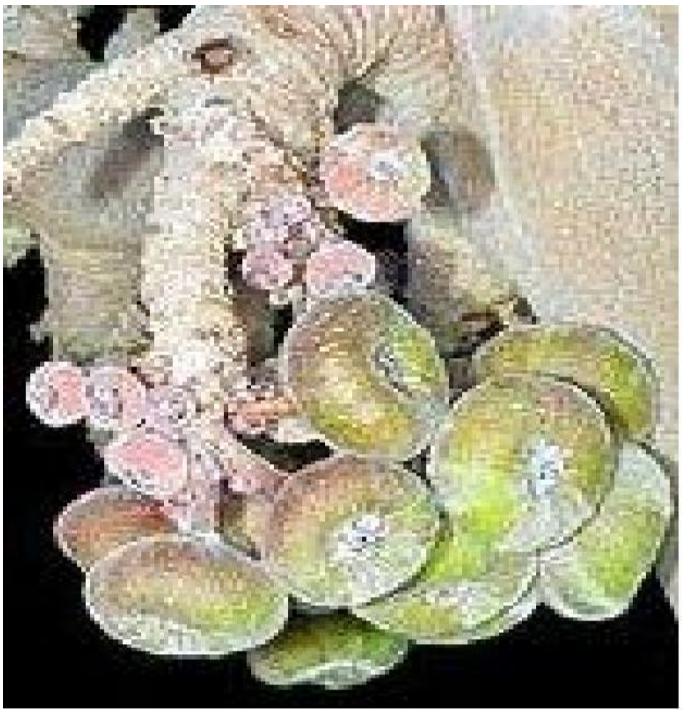
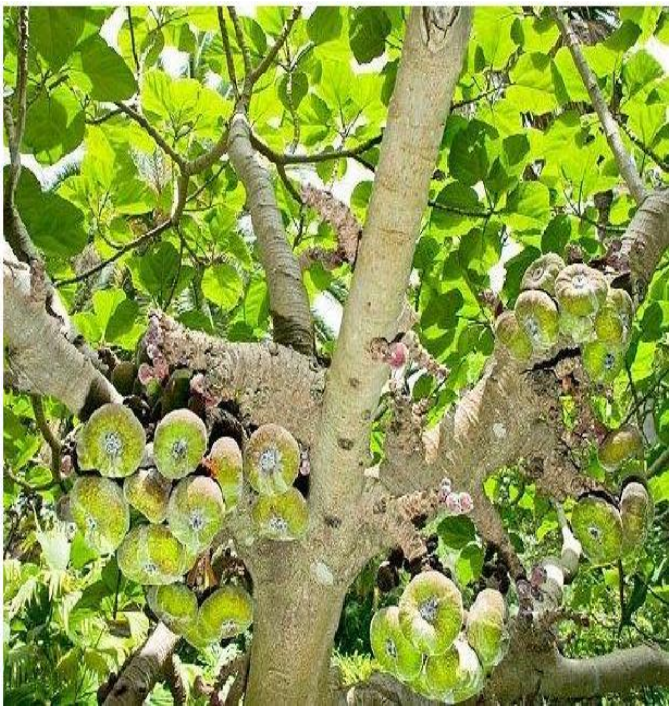



Fig. No. 2: Fruits of Ficus Auriculata (Timal)

III. MATERIAL AND METHODS

a). Collection of Plant Material

The fresh barks of Ficus auriculata was obtained from the Maldevta Raipur forest. The plant material was cleaned and dried in shade for 10 days.

b). Preparation of Extract

For aqueous extract the dried bark powder 200 gm was macerated with 2000 ml chloroform water (1:10) for three days. Chloroform water was used to prevent the growth of microorganism in the extract.
The extractive was filtered and concentrated over a water bath and further dried in vacuum oven till constant weight (Bhattarai and Bhuju, 2011).

c). In Vitro α-amylase inhibitory assay (Tamil et al., 2011)

The assay was carried out following the standard protocol with slight modifications. Starch azure (2 gm) was suspended in 0.2 ml of 0.5 M Tris-HCL buffer (pH 6.9) containing 0.01 M $CaCl_2$ (substrates solution). The tube containing solution were boiled for 5 min. & then pre incubated at 37°C for 5 min. water extract of F. auriculata was dissolved in DMSO for obtaining the concentration of 10µg/ml, 20 µg/ml, 40 µg/ml, 60 µg/ml, 80 µg/ml and 100µg/ml. Then 0.2 ml of plant extract of particular concentration was added to the tube containing the substance solution. In addition 0.1 ml of salivary amylase in Tris-HCL buffer (2unit/ml) was added to the tube containing the plant extract and substrate solution. The reaction was carried out at 37°C for 10 min. The reaction was stopped by adding 0.5 ml of 50% acetic acid in each tube and was centrifuged at 3000 rpm for 5 min. at 4°C. The absorbance of resulting supernatant was measured at 595 nm using U.V. spectrophotometer. Acarbose (α-amylase inhibitor) was used as a standard drug. The experiment was repeated thrice. The α-amylase inhibitory activity was calculated by using following formula:

$$\text{The } \alpha\text{-amylase inhibitory activity} = \frac{\text{Control - Test}}{\text{Control}} \times 100$$

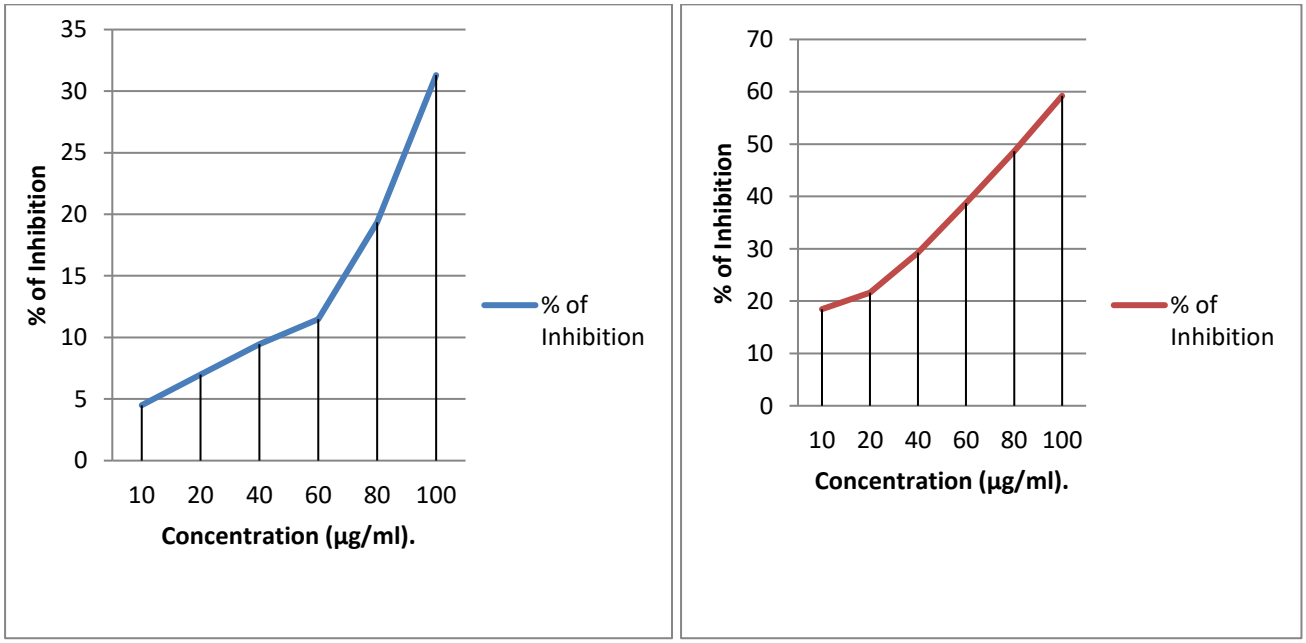
IV. RESULTS

Table No. 1: Inhibition of Ficus auriculata aqueous extract & Acarbose at 595nm			
S.No	Conc.(µg/ml)	% of inhibition	
		Ficus auriculata sample	Standard drug Acarbose
1	10	4.5	18.46
2	20	6.98	21.62
3	40	9.45	29.27
4	60	11.48	38.73
5	80	19.36	48.64
6	100	31.3	59.23

Table No. 1: Inhibition of Ficus Auriculata Aqueous Extract & Acarbose at 595nm

V. ANTIDIABETIC ACTIVITY

A. The A-Amylase Inhibitory Method



% of Inhibition of Ficus Auriculata Sample, % of Inhibition of Standards Drugs Acarbose.

Fig. No: 3 % Inhibition of in Vitro A-Amylase Inhibitory Method

A-amylase inhibitory method is one of the most common methods to evaluate anti-diabetic activity because of its reliability and reproducibility. Aq. Extract of F. auriculata showed promising α-amylase inhibitory activity in conc. dependent manner.

VI. RESULT & DISCUSSION

Various crude drugs and their product have been used in diabetic treatment and their use is also reported in various traditional systems of medicines. Type 2 DM is characterized by an abnormal post-prandial increase in blood glucose level. Alpha amylase catalyzes the hydrolysis of 1, 4-glycosidic linkages of starch, glycogen, and various oligosaccharides into simpler sugars and they are available for the intestinal absorption. Hence, inhibition of alpha amylase is considered to be effective in controlling diabetes by decreasing the absorption of glucose from starch (Jain et al., 2014). Present study is to investigate the enzyme inhibitory activity of crude extracts isolated from stem bark of Ficus auriculata and was compared with acarbose as standard drug. From the above study it was observed that Ficus auriculata bark shows significant alpha amylase activity. Hence it can be concluded that the Ficus auriculata bark can be effective in postprandial hyperglycemia and type-2 daibetes in single or in a combination.

VII. CONCLUSION

Traditionally Ficus auriculata fruit is known for its sweet taste and is used by peoples as condiment. However there are no contraindications reported in this plant of its edible use in diabetic peoples. The present study provides an opportunity to investigate antidiabetic potential on this plant with the fact that the plant possesses the inhibitory activity on salivary amylase. However isolation and characterization of the active compound is essential to prove the activity.

REFERENCE

[1]. Ahamad J. and Hamad J.K. In-vitro antioxidant and α-amylase inhibition activity of Cucurbita maxima. Journal of Pharmacognosy and Phytochemistry, 2013, 2(2), 121-124.
[2]. Bhattarai S. and Bhuju R.D. Antimicrobial Activity of Useful Parts of Woodfordia fruticosa (Linn.) Kurz. of Nepal. International Journal of Pharmaceutical & Biological Archives, 2011, 2(2), 756-761.
[3]. Challa. S., Hemalatha P., Jyothi K.S.N. and Avanthi A. A comparative analysis on the alpha amylase inhibitory potential of six ornamental medicinal plants. Journal of Natural Product & Plants Resources, 2013, 3(3), 1-6.
[4]. Chandra K., Nautiyal B.P. and Nautiyal M.C. Ethno-botanical resources as supplementary foods and less known wild edible fruits in district Rudraprayag (Uttarakhand). Journal of Human Ecology, 2013, 42(3), 259-271.
[5]. Davidson S., Haslett C., Chilvers E.R., Boon N.A. and Colledge N. R. Principles and practice of medicine. Churchill Livingstone, 19th Ed., 2002, 642- 682.
[6]. Gaire B.P., Lamichhane R., Sunar C.B. and Shilpakar A. Phytochemical screening and analysis of antibacterial and antioxidant activity of Ficus auriculata (Lour.) Stem Bark. Pharmacognosy Journal, 2011, 3(21), 49-55.
[7]. Jain C., Singh A., Kumar P. and Gautam K. Antidiabetic potential of flavanoids and other crude extracts of stem bark of Mangifera indica Linn- a comparative study. Journal of Scientific & Innovative Research, 2014, 3(1), 21-27.
[8]. Jarald E., Goshi S.B. and Jain D.C. Diabetes and herbal medicines. Indian Journal of Pharmacology & Therapy, 2008, 7, 97-106.
[9]. Khandelwal K. R. Practical Pharmacognosy. Nirali Prakashan, Pune, Maharastra, 8th Ed., 2008, 149-156.
[10]. Katzung B.G. Basic & clinical pharmacology. Mc Grawhill, 10th Ed., 2006, 1007-1008.
[11]. Lim T.K. Edible medicinal and non-medicinal plants fruits. Springer, 2012, 3, 358-361.
[12]. Mathew S. and Britto S.J. In vitro antidiabetic activity of Nerolidol, an active compound isolated from Alpinia Calcarata. International Journal of Science and Research, 2014, 3(6), 2712- 2715.
[13]. Narkhede M.B. Evaluation of alpha amylase inhibitory potential of four traditional culinary leaves. Asian Journal of Pharmaceutical and Clinical Research, 2012, 5(2), 75-76.
[14]. Nair S.S., Kavrekar V. and Mishra A**.** In vitro studies on alpha amylase and alpha glucosidase inhibitory activities of selected plant extracts. European Journal of Experimental Biology, 2013, 3(1), 128-132.
[15]. Pandeya K.B., Tripathi I.P., Mishra M.K. and Dwivedi N.A. Critical review on traditional herbal drugs, an emerging alternative drug for diabetes. International Journal of Organic Chemistry, 2013, 3, 1-22.
[16]. Patel P., Darji N. and Patel B. Antidiabetic herbal drugs a review. International Research Journal, 2012, 3(1), 18-29.
[17]. Pole S. Ayurvedic medicine. The principles of traditional practice. Elsevier, 2006, 3-14.
[18]. Ponnusamy S. Traditional Indian antidiabetic medicinal plants as inhibitors of pancreatic α -amylase and α-glucosidase. Journal of Pharmacy and Pharmaceutical Science, 2014, 2(1), 1-16.
[19]. Sales P.M., Souza P.M., Simeoni L.A., Magalhaes P.O. and Silveira D. α-amylase inhibitors - a review of raw material and isolated compounds from plant source. Journal of Pharmacy and Pharmaceutical Science, 2012, 15(1), 141-183.
[20]. Saklani S. and Chandra S. In vitro antimicrobial activity, nutritional profile and phytochemical screening of wild edible fruit of Garhwal Himalaya (Ficus Auriculata), International Journal of Pharmaceutical

Sciences Review and Research, 2012, 12(2), 61-64.
[21]. Saini R., Garg V. and Dangwal K. Comparative study of three wild edible fruits of Uttrakhand for antioxidant, antiproliferative activities and polyphenolic composition. International Journal of Pharma and Bio Sciences, 2012, 3(4), 158-167.
[22]. Singh K. and Verma B. Role of ayurvedic herbs on madhumeha (diabetes mellitus). International Journal of Ayurvedic and Herbal Medicine, 2013, 3(2), 1136-1144.
[23]. Sirisha N., Sreenivasulu M., Sangeeta K. and Chetty C. M. Antioxidant properties of ficus species - a review. International Journal of Pharm. Tech Research, 2010, 2(4), 2174-2182,
[24]. Tamil I.G., Kumar B.D., Kumar M.N., Kumar M.S and Mitra A. In Vitro study on α-amylase inhibitory activity of an Indian medicinal plant of Phyllanthus amarus. Indian Journal of Pharmacology, 2010, 42(5), 280-282.
[25]. The Wealth of India, Govt. of India publication, 1st supplements series. CSIR, 2009, 3, (D-I), 128-129.
[26]. Tripathi K.D. Essentials of medical pharmacology. Jaypee Brother publication, Delhi, 7th Ed., 2013, 258-281.