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Antidiabetic activity of *Parmelia perlata* in rats

Vijai Lakshmi[1]*, Keerti Ameta[1], Ravi Sonkar[2], Mohammad Kaleem Ahmad[1], Santosh Kumar Agarwal[1], Abbas Ali Mahdi[1]

[1]Department of Biochemistry, King George Medical University, Chowk, Lucknow-226003, (INDIA)

[2]Biochemistry Division, CSIR-Central Drug Research Institute, Lucknow-226001, (INDIA)

E-mail: vijlakshmius@yahoo.com

ABSTRACT

The present study was to evaluate the antidiabetic activity of the *Parmelia perlata* in streptozotocin induced diabetic rats. The ethanol extract and its chloroform fraction showed promising results. doses respectively. The ethanol extract showed promising activity 21.5% at 500 mg/kg in STZ-s model. On further fractionation of the ethanol extract into four fractions, the activity was localized only in hexane and chloroform fractions (at 250 mg/kg hexane fraction showed 20.33% and chloroform fraction showed 30.2%). The most active fraction was chloroform fraction. Further work on this fraction is in progress and the active molecules from this fraction will be reported later.

KEYWORDS

Parmelia perlata;
Antidiabetic activity;
STZ model.

INTRODUCTION

Diabetes mellitus is a serious chronic metabolic disorder that has a significant impact on the health, quality of life, and life expectancy of patients, as well as on the health care system. The World Health Organization (WHO), has projected that the global prevalence of type 2 DM will more than double from 135 million in 1995 to 300 million by the year 2025. Herbal drugs are prescribed widely because of their effectiveness, less side effects and relatively low cost[1]. Therefore, investigation on such agents from traditional medicinal plants has become more important[2]. In the present study we have selected the *Parmelia perlata* leaves for its antidiabetic property study.

Parmelia perlata belongs to the family Parmeliaceae. Mainly found in Himachal Pradesh and West Bengal. Commonly called as Stone Flower. It is also called Chharila. Chharila is a lichen crude drug sold in Indian bazaars and used in Ayurvedic and Unani systems of medicine. Three lichens can be called Chharila: Parmotrema Chinense, *Parmotrema perforatum*, and/or *Everniastrum cirrhatum*. The smoke of Chharila is believed to relieve headaches. When powdered it is applied on wounds, and it is considered to be a good cephalic snuff. Chharila has also been considered useful in dyspepsia, spermatorrhoea, amonorrhoea, calculi, diseases of the blood and heart, stomach disorders, enlarged spleen, bronchitis, bleeding piles, scabies, leprosy, excessive salivation, soreness of the throat, toothache, and pain in general. These lichens are dual organisms composed of a symbiotic relationship between an alga and a fungus. The fungus, usually an Ascomycete, provides the plant its shape, and the alga provides the ability to photosynthesis. This successful combination is able to produce a more elaborate and durable organism than either partner alone. These are able to colonise inhospitable areas such as bare rock.

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As pioneer plants, lichens break down the rock surface and, together with decaying material from the lichen, eventually form soil conditions suitable for other plants. Many lichens are epiphytic (able to grow on trees), gaining nutrition from rain running down tree trunks. Lichens are variable in shape, either tubular, upright and branching, or flat and leaf-like or forming an amorphous greyish crust.

Parmelia sp. is mentioned in India Materia Medica as useful in treating a number of ailments[3]. The Species of *Parmelia* are collected in large quantities as a food supplement in India. *Parmelia perlata* used to treat wounds, infections, inflammation, skin diseases, diarrhea, dysentery, cough, fever and renal calculi[4] *Parmotrema chinense* in particular, along with *Parmelia perforatum*, is used medicinally in India as a diuretic, headache remedy, sedative and antibiotics for wounds[5,6]. *Parmelia perlata* contains many chemicals, atranorin, lecanoric acid, orcin, erythrolein, azolitmin, spaniolitmint. *Parmelia perlata* extract is one of the most common lichen substances gave positive patch test reactions in eight subjects in a routine series[7,8]. These subjects also reacted to fumarprotocet raric acid and some of them to evernic acid, stictic acid and Usnic acid gave negative reactions

MATERIAL AND METHODS

Collection of the plant material

The plant material was purchased from the local market and was authenticated by the Botany Division of the Lucknow University.

Extraction and fractionation procedure

Palmelia perlata (1.0Kg.) was percolated in 95% ethanol at room temperature in glass percolator four times. The combined ethanol extract was filtered and concentrated in a rotavapour below 50^0C to a green viscous mass, which was dried under high vacuum to remove last traces of the solvent. The ethanol extract was evaluated for its antidiabetic activity in STZ-s model. The ethanol extract was fractionated into four fractions hexane, chloroform, n-butanol soluble and n-butanol insoluble fractions. All these fractions were screened for antidiabetic activity.

Bioassays

Animals

Male albino rats of Sprague Dawley strain (8 to 10 weeks of age, body weight 120 ± 20 g) were procured from the animal colony of the Central Drug Research Institute, Lucknow, India. Breeding colonies of animals were maintained under SPF (specific pathogen free) environment in standard housing conditions. Research on animals was conducted in accordance with the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) formed by the Government of India in 1964.

Chemicals

Streptozotocin, metformin, were purchased from Sigma Chemical Company, St. Louis, USA. All other chemicals were of highest purity grade.

STZ-s Procedure

Male albino rats of Sprague Dawley strain of the body weight 120±20g. were selected for this study. Animals, 3/ cage were kept for 7 days under standard experimental conditions before the experiment. Animals were given standard rat-pellet diet and tap water ad libitum. Day 'O'-Day before experiment, animals were kept for overnight starvation. Day '1': STZ (Streptozotocin, Sigma, USA) was dissolved in 100 m M citrate buffer pH 4.5 and calculated amount of the fresh solution was injected to overnight fasted rats (45mg./Kg.) intraperitonially. Day '2': Rats remained as such in the same conditions. Food pellets were removed on the penultimate day at 5:00 P.M. in the evening and animals were kept on overnight starvation. Day '3': Blood-glucose level was estimated between 9:30-10:00 A.M. in all animals. Blood was taken from tail of the rats by stab techniques and the glucose level was estimated using ''Advantage Glucometer'' of Boehringer Mannheim Co, USA. Blood was checked 48 hours later by glucostrips and animals showing blood glucose values between 160 to 270mg./dl. (8 to 15 mM) were included in the experiments and termed diabetic. The diabetic animals were divided into groups consisting of 5 to 6 animals in each group. Rats of experimental groups were administered suspension of the desired test samples orally (made in 1.0% gum acacia) at 500 mg/ Kg body weight in the case of ethanol extract and at

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250 mg/Kg.in case of the all the fractions. In the case of the standard drug Metformin, the dose was taken at 100mg/Kg. The animals of the control group were given an equal amount of 1.0% gum acacia. A sucrose load of the 2.5g/Kg of the body weight was given after 30 minutes of the drug administration. After 30 minutes of the post sucrose load blood glucose level was again checked by gluco-strips at 30, 60, 90, 120, 180, 240, 300 minutes and 24 hours respectively. The animals not found diabetic after 24 hours post treatment of the test samples were not considered and omitted from the calculations and termed as non responders. The animals which did not show any fall in blood glucose profile in a group while the others in that group showed fall in blood glucose profile were also considered as non responders. The food but not the water was withheld from the cages during the experimentation. Comparing the AUC of experimental and control groups determined the percent of antihyperglycemic activity. Statistical comparison between groups was made by the Student's "t" test.

TABLE 1 : Antihyperglycaemic effect of *Parmelia perlata* extract and fractions and standard drug metformin on sucrose challenged streptozotocin-induced diabetic rats

S.No	Compounds	Dose mg/kg.	% Activity in sucrose challenged STZ induced diabetic rats model
1	Crude EtOH ext.	500	21.5**
2	Hexane fr.	250	20.2**
3	$CHCl_3$ fr.	250	30.2**
4	n-Butanol fr.	250	12.2
5	n-Butanol insol.fr.	250	8.5
6	Metformin (Standard drug)	100	26.4** – 35.8**

***Statistically significant at *P<0.05 and **P< 0.01 in comparison to control. n = 6 in each group**

RESULTS AND DISCUSSION

The ethanol extract and its hexane, chloroform fractions showed promising results. The ethanol extract showed promising activity 21.5% at 500 mg/kg in STZ-s model. On further fractionation of the ethanol extract into four fractions, the activity was localized only in hexane and chloroform fractions (at 250 mg/kg hexane fraction showed 20.33% and chloroform fraction showed 30.2%). The most active fraction was chloroform fraction. Further work on this fraction is in progress and the active molecules from this fraction will be reported later.

REFERENCES

[1] S.Venkatesh, G.D.Reddy, B.M.Reddy, M.Ramesh, A.V.N.Rao; Antihyperglycemic activity of Caralluma attenuate, Fitoterapia, **74**, 274-279 **(2003)**.

[2] V.Suba, T.Murugesan, G.Arunachalam, S.C.Mandal, B.P.Saha; Anti-diabetic potential of Barleria lupulina extract in rats. Phytomedicine, **11**, 202-205 **(2004)**.

[3] P.Halama, C.V.Haluwin; Antifungal activity of Lichen extracts and Lichenic acids. A Journal of Biocontrol., **49(1)**, 95-107 **(2004)**.

[4] T.Tay, T.A.Ozdemir, M.Yilmaz, H.Turk, M.Kivane; Evaluation of the antimicrobial activity of the acetone extract of the Lichen Ramalina farinacea. Anadolu University, Turkey, 384-388 **(2004)**.

[5] E.F.Dayan, G.R.Joanne; Lichens as a potential source of pesticides. A Journal of Pesticide Outlook, **3**, 229-232 **(2001)**.

[6] H.Z.Zeytinoglu, Jncesu, A.Tuylu; Determination of genotoxic, antigenotoxic and cytotoxic potential of the extract from Lichen Cetraria aculeate in vitro. Anadolu University,Turkey, 320-322 **(2007)**.

[7] A.Ozdemir; The antimicrobial activity of Lichen cetraria aculeate. A Journal of Current Science, **29**, 850-854 **(2003)**.

[8] A.Khatwa, A.Robai, A.Jawhari; Lichen a cids as uncouplers of oxidative phosphorylation of mouse-liver mitochondria. Nat.Toxins., **4**, 96-102 **(1996)**.