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RESEARCH ARTICLE

ANTI-DIABETIC ACTIVITY OF POLYHERBAL FORMULATION CONTAINING SOME BITTER PLANT CONSTITUENTS IN ALLOXAN INDUCED DIABETIC RATS

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Abstract

The present study was aimed to evaluate the anti diabetic activity of polyherbal formulation containing some bitter plant constituents like neem, methi, karela fruit, amla , jamun seeds, kavat fruit in alloxan induced diabetic rats. Diabetic wistar albino rats were treated with standard drug glibenclamide and prepared drug formulation in two different doses 100 mg and 200 mg. Hypoglycemic effect was evaluated in these rats and the efficacy of the prepared drug was compared to the standard drug glibenclamide. Prepared drug formulation was administered for 21 days in alloxan induced diabetic rats. At the end of the study period blood glucose level were statistically analyzed based on the results. Poly herbal formulation produced a significant reduction in blood glucose levels when compared with non treated diabetic rats. So the present research work was confirmed that the polyherbal formulation possess hypoglycemic effect significantly

INTRODUCTION

Herbs had been used by all types of cultures throughout history. It was an integral part of the development of modern civilization. Primitive man observed and appreciated the great diversity of plants available to him. The plants provided food, clothing, shelter and medicine. Much of the medicinal use of plants seems to have been developed through observations of wild animals and by trial and error. Herbal medicinal products are defined as any medicinal product, exclusively containing one or more active substances obtained from plants. WHO reports 80% of the world population relies on the drug from natural origin. A large number of medicinal plants are used in the treatment of diabetes. Diabetes is a metabolic disorder with major complication associated with hyperglycemia, inflammation, foot ulcer, nerve disorders and sexual depression (Margret et.al, 2010).

Herbal medicines are the oldest remedies known to mankind. Herbs had been used by all cultures throughout history but India has one of the oldest, richest and most diverse cultural living traditions associated with the use of medicinal plants (Bhatt N et.al 1998). In the present scenario, the demand for herbal products is growing exponentially throughout the world and major pharmaceutical companies are currently conducting extensive research on plant materials for their potential medicinal value. In many journals national and international we find an increasing number of research publications based on herbal drugs. Many analysis based studies regarding pharmacological research in India (Dandiya PC et.al 1974) have been conducted in the past.

Diabetes is the world's largest endocrine disease involving metabolic disorder of carbohydrate, fat and protein. According to the WHO projections, the prevalence of diabetes is likely to increase by 35% (King H et.al.1998). Statistical projections about India suggest that the number of diabetics will rise from 15 million in 1995 to 57 million in the year of 2025 making it the country with the highest number of diabetics in the world. In the present work we have developed an anti diabetic polyherbal formulations containing bitter plants and assessed their potential in the treatment of diabetes.

MATERIALS AND METHODS

Different herbs based on exhaustive literature survey were selected and these were authenticated by the Agharkar Research Institute, Pune.

Method of Preparation

1. All the individual drugs were dried using hot air oven at 40^{o}C for 24 hours.
2. The individual drugs were then crushed using willing grinder and passed through mesh no. 40.
3. The individual drugs were then weighed as per the quantity required on digital precision balance (Accuracy: 0.1g.)
4. The drugs were mixed geometrically using double cone blender.

The mixed formulation was weighed, labeled and packed in glass bottles. The weight of the formulation was 100 and 200 gram. Two formulations with different proportion were prepared. Both herbal formulations were prepared with same method as reported. The constituents of the formulations are as follows:

Animals

Albino rats (100- 200 g body weight) were used for this study. The animals were kept under a standard condition maintained at 23^{o}C-25^{o}C and given a standard pellet diet (Hindustan lever, Bangalore, India). The experimental protocol was approved by the Institutional Animal Ethical Committee (IAEC) and all the experiments were carried out by following the guidelines of CPCSEA.

Anti-diabetic activity

One gram of prepared formulations was separately triturated with polyvinyl pyrrolidone (PVP 0.2 g) and added water for injection in successive amount to make up the final volume to 100 ml (0.2%w/v). Adult albino rats of either sex (100-200 gm) were selected for the study and were divided in two groups of six in each group. Rats were acclimatized for a period of two-three days in the new environment and subsequently used for further study. Toxicological studies revealed that albino rats tolerated considerably high dose of prepared formulations (700µg/kg body weight, orally) without any toxic manifestation. Therefore doses of 150 µg twice a day/kg-body weight of prepared formulation were administered orally to the alloxan induced diabetic albino rats. Animals were divided in four groups of six animals each. The diabetes was experimentally induced by i.v. administration of alloxan monohydrate 150 µg twice a day/kg of body weight. Alloxan is given by rapid intravenous injection, as its half-life in the body is only a few seconds. The diabetes is induced within 24 hours if the rats were fasted before the alloxan injection. Diabetes is checked by measuring blood glucose level using Glucometer. Haemo-gluco test 200-800R (HGT) method was utilized for the measurement of blood glucose level. Blood Sample collected by retro orbital puncture under light ether anesthesia. The blood glucose level was determined after fixed intervals of four days and the study was continued for a period of twenty-eight days.

Group I: Control Adult albino rats were feed with 0.1 ml poly vinyl pyrolidone (PVP) solution (0.2%w/v).
Group II: Glibenclamide treated Adult albino rats were orally administered with 50 µg twice a day/Kg of body weight of Glibenclamide.
Group III: Formulation1 treated Adult albino rats were orally administered with 150 µg twice a day/kg of body weight of Formulation-1.
Group IV: Formulation2 treated Adult albino rats were orally administered with 150 µg twice a day/kg of body weight of f Formulation-2.

The observations with respect to the measurement of blood glucose level have been recorded in Table 2 and the efficiency of the formulations with respect to their potential in the anti diabetic therapy in terms of percent reduction of glucose level has been tabulated in Table 3

RESULTS AND DISCUSSION

In the present work, we evaluated the hypoglycemic activity of the prepared formulations in alloxan induced diabetic rats. As shown in the table 3 the prepared formulation significantly reduced the blood glucose level in alloxan induced diabetic rats. The drugs were administered through oral routs in a dose of 150 µg twice a day/kg of body weight of rat with 0.2 % polyvinyl pyrrolidone solution. The hypoglycemic activity of formulaion-1 showed 67.33% anti-diabetic activity whereas formulation-2 showed 68.94% activity. Both the formulations have shown

potential in their role to reduce the blood glucose level. Formulation 2 showed slight higher activity as compared to the Formulation 1 (Table 2 and 3). This may be because of the increase in the proportion of individual content of Formulation 2 (Table1). Formulation 2 may possess a higher anti diabetic activity. A deeper insight into these herbs may lead to development of more potent anti diabetic formulations.

Table 1: Ingredients for formulation

Sr. No	Ingredients	Common name (Hindi)	Part used	Quantity taken	
				Formulation-1 (100mg)	Formulation-2 (200mg)
1	Limonia Acidissima	Kavat	Fruit Pulp	15	30
2	Azadirachta Indica	Neem	Leaf	15	30
3	Trigonella foenum-graecum	Fenugreek (Methi)	Seed	15	30
4	Syzygium cumini	Jamun	Seed	15	30
5	Momordica charantia	Karela	Fruit	15	30
6	Phyllanthus emblica	Amla	Fruit	15	30
7.	Pectin and guar gum			100	200

Table 2: Estimation of Blood glucose level in Alloxan induced diabetic albino rats

Group	AIBGL Mg/dL	First Day (mg/dl)	Forth Day (mg/dl)	Eighth Day (mg/dl)	Twelfth Day (mg/dl)	Sixteenth Day (mg/dl)	Twentieth Day (mg/dl)	Twenty-Forth Day (mg/dl)	Twenty-Eighth Day (mg/dl)
GP-I	368.67 ± 5.13	365.05 ± 6.15	365.33 ±10.36	362.66 ±9.15	358.01 ± 5.19	356.67 ±15.3	353.33 ± 6.33	352.33 ± 11.55	249.67 ± 6.89
GP-II	304.17 ± 9.60	266.49 ±6.11	210.33 ±8.11	188.32 ±12.11	165.33 ±11.52	154.33 ±5.56	134.5 ±5.89	121.14 ±13.23	101.33 ±5.33
GP-III	412.5 ±5.69	387.5 ±9.55	353.88 ±12.78	328.17 ±9.36	296.5 ±10.52	263.43 ±7.2	228.62 ±8.66	186.76 ±7.5	134.76 ±5.18
GP-IV	426.36 ±8.23	415.34 ±8.48	387.46 ±11.63	342.48 ±8.54	302.79 ±10.82	272.68 ±8.64	236.72 ±11.96	186.67 ±12.72	132.43 ±8.94
Values reported are Mean ± S.D. and n=6. AIBGL: Alloxan induced blood glucose level									

Table 3: Percentage reduction of Blood glucose level in Alloxan induced diabetic albino rats

Group	First Day (mg/dl)	Forth Day (mg/dl)	Eighth Day (mg/dl)	Twelfth Day (mg/dl)	Sixteenth Day (mg/dl)	Twentieth Day (mg/dl)	Twenty-Forth Day (mg/dl)	Twenty-Eighth Day (mg/dl)
GP-I	0.98	0.97	1.63	2.71	3.25	4.16	4.43	5.15
GP-II	12.38	30.85	38.08	45.64	49.26	55.78	60.17	66.68
GP-III	6.06	14.21	20.44	28.12	14.00	44.57	54.72	67.33
GP-IV	2.58	9.12	19.67	28.98	36.04	44.48	56.22	68.94

REFERENCES

1. Adithan C. (1996): Pharmacological research in India, 1972-1995 - an analysis based on IPS conferences. Indian J. Pharmacol; 28:125-128
2. Bhatt N (1998): Ayurvedic drug industry - challenges of today and tomorrow, Proceeding of the first national symposium of Ayurvedic drug industry, organized by ADMA, New Delhi..
3. Dandiya P.C, Bapna J.S. (1974): Pharmacological research in India, Ann. Rev. Pharmacol; 14:115-126.
4. Grover J.K., Vats V, Rathi S.S., Dawar R. (2001): J.Ethnopharmacol, Vol. 76, 233-238.
5. H.S. Chandel, A. Pathak And M. Tailang,(2011): Polyherbal Formulations For Anti Diabetic Therapy, International Journal of Pharmacy and Pharmaceutical Sciences, Vol. 3 Suppl 3, 226-228.
6. King H., Aubert R.E., Herman W.H. (1998): Diabetes Care, Vol.21, 1414-1431.
7. Margret Chandira, B.Jayakar, (2010): Formulation and Evaluation of Herbal Tablets Containing Ipomoea Digitata Linn. Extract, International Journal of Pharmaceutical Sciences Review &Research Volume 3, Issue 1, 101-106.
8. Obatomi D.K, Bikomo E.O,(1994),Anti-Diabetic Properties of the African Mistletoe in Streptozotocin Induced Diabetic Rats, Journal of Ethnopharmaco,.Vol.43 (1), 7-13.
9. Pandey M, Khan A, (2002): Hypoglycemic Effect of Defatted Seeds and Water Soluble Fibers of Syzygium cumuni in Alloxan Diabetic Rats, Indian Journal of experimental biology, Vol.40, 1178.
10. Singh H. (1990-1999): Steady decline in clinical pharmacology research in India - A decade trend-analysis of IJP research publications Abstracts of XXXIII annual conference of IPS, 2000. Indian J Pharmacol 2001; 33:51-70.
11. Sajeeth C.I, Manna P.K and Manavalan R, (2011): Antioxidant Activity of Polyherbal Formulation on Streptozotocin Induced Diabetes in Experimental Animals, Pelagia Research Library Der Pharmacia Sinica, 2 (2): 220-226.