**International Journal of Diabetes and Endocrinology**
2017; 2(3): 36-39
http://www.sciencepublishinggroup.com/j/ijde
doi: 10.11648/j.ijde.20170203.11

# *In-vivo* Antidiabetic Activity of Methanolic Extract of *Euphorbia hirta* L

**Sangeeta Devi[1, *], Muneesh Kumar[2]**

[1]Department of Botany Govt. Degree College Doda, University of Jammu, Jammu and Kashmir, India
[2]Department of Zoology Govt. Degree College Doda, University of Jammu, Jammu and Kashmir, India

## Email address:
drmuneesh.ju@gmail.com (S. Devi)
[*]Corresponding author

## To cite this article:
Sangeeta Devi, Muneesh Kumar. *In-vivo* Antidiabetic Activity of Methanolic Extract of *Euphorbia hirta* L. *International Journal of Diabetes and Endocrinology*. Vol. 2, No. 3, 2017, pp. 36-39. doi: 10.11648/j.ijde.20170203.11

**Received**: February 24, 2017; **Accepted**: June 6, 2017; **Published**: July 27, 2017

**Abstract:** Diabetes is a metabolic disorder which results from pancreatic beta cells dysfunction & insulin resistance and are characterized by hyperglycemia. The *in-vivo* anti-diabetic potential of *E. hirta* L. was also determined so as to justify the traditional usage of the plant in treating diabetes. The result of the present study confirmed that the methanolic extract of *E. hirta* possess significant anti-diabetic activity *in-vivo*, this shows that the plants has the potential for the development of drugs in combating diabetes.

**Keywords:** Diabetes, *Euphorbia hirta*, Hyperglycemia, *In-vivo*

## 1. Introduction

Every year the number of diabetic patients is growing frighteningly all over the World. Diabetes is a chronic disease characterized by the disturbance in carbohydrate, fat, protein metabolism. Diabetes mellitus is the third leading cause of death after heart disease and cancer. In many developed countries the complications of diabetes affect the eye, kidney, and nervous system. It is a major cause of blindness, renal failure, amputation, heart attacks, and stroke. It should, however, be noted that diabetes incipidus is another disorder characterized by large volumes of urine excretion due to ADH deficiency (Satyanarayan., 2004).

Type I Diabetes mellitus (IDDM)

It is a chronic autoimmune disease associated with selective destruction of insulin producing pancreatic β-cells. The onset of clinical disease represents the end stage of β-cell destruction leading to type 1 DM. Type-1 is also known as childhood or juvenile diabetes as most people develop it at childhood. (Homsi and Lukic., 1993; Conget., 2002).

Type 2 Diabetes mellitus (NIDDM)

This form of DM is formerly called noninsulin- dependent or adult (older the 40 years of age) diabetes mellitus. Now DM2 is increasingly diagnosed in young people, adolescents and children. DM2 comprises 80% to 90% of all cases of DM. The relative importance of defects in insulin secretion or in the peripheral action of the hormone in the occurrence of DM2. The intimate relationship between the secretion of insulin and the sensitivity of hormone action in the complicated control of glucose homeostasis, it is practically impossible to separate the contribution of each to the etiopathogenesis of DM2 (Conget., 2002).

Most of the hypoglycemic agents used in allopathic medicines are reported to have side effects in the long run. Therefore, there is a need to search for effective and safe drugs for diabetes. The use of herbal medicines for the treatment of diabetes mellitus has gained importance throughout the world. The World Health Organization also recommended and encouraged this practice especially in countries where access to the conventional treatment of diabetes is not adequate. There is an increased demand to use natural products with antidiabetic activity due to the side effects associated with the use of insulin and oral hypoglycemic agents.

*E. hirta* L. is one of such herbs belonging to the family Euphorbiaceae which is frequently seen occupying open waste spaces and grasslands, road sides, and pathways in many parts of the world. The leaves of *E. hirta* L. are found to contain flavonoids, polyphenols, tannins, sterols, alkaloids, glycosides and triterpenoides. The plant has a reputation for

increasing milk flow in women because of its milky latex and is used for other female complaints as well as diseases like bronchitis, asthma, eczema, dysentery. It is used as antidiarrheal, antispasmodic, antiinflammatory, antifungal, anticancer, antimalarial, antiamoebic, antibacterial and antihelmentic etc. The present investigation was carried out to compile the medicinal properties of different plant parts of *E. hirta* L. and to compare their traditional uses with scientific evidences.

# 2. Materials and Methods

Collection of Plant Material

The Indigenous plants were collected from different locations of Bhopal (M. P.) region in the month of Sept.-Oct. 2012 and Jan.-Feb. 2013. The Plants of *Euphorbia hirta* L. were selected on the basis of ethnomedicinal value for further study.

Authentication of Plants

The plants were acknowledged by a senior Botanist Dr. Tayaaf Safi Principal Gandhi P. R. college Bhopal and herbarium deposited at Safia Science college Bhopal by Voucher specimen No. 474/ Bot. / Saifia / 14. (*Euphorbia hirta* L.)

Plant parts used:

The whole plant is used; especially leaves are commonly used.

Mono Figure

Bengali Names: Barokhervi, English Names: bearing spurge, asthma herb, snakeweed, Scientific Name: *Euphorbia hirta* Linn., Family: Euphorbiaceae, Duration: Annual Growth Habit: Multi-branched herb Bangladesh Nativity: Native.

Distribution

*Euphorbia hirta* L. is a medicinal, rhizomatous herb distributed in Southern Western Ghats of India and Northern East Coast of Tamil Nadu. In East and West Africa extracts of the plant are used in treatment of asthma and respiratory track inflammations. It is also used for coughs, chronic bronchitis and other pulmonary disorders in Malagasy. The plant is also widely used in Angola against diarrhoea and dysentery, especially amoebic dysentery.

Morphology

It is a small, erect or ascending annual herb reaching up to 50 cm, with hairy stems. The leaves are opposite, elliptical, oblong or oblong-lanceolate, with a faintly toothed margin and darker on the upper surface. The flowers are small, numerous and crowded together in dense cymes about 1 cm in diameter. The fruits are yellow, three-celled, hairy, keeled capsules, 1-2 mm in diameter, containing three brown, four-sided, angular, wrinkled seeds. Parts used leaves, stem and flowers (Patil *et al*., 2009).

*Ethnomedicinal values of Euphorbia hirta L*

The whole plant is commonly applied to cure various diseases, especially gastrointestinal disorders including intestinal parasites, diarrhea, peptic ulcers, heartburn, vomiting, and amoebic dysentery, afflictions of the skin and mucous membranes including warts, scabies, tinea, thrush, aphthae, fungal afflictions, and measles), and respiratory system disorders including asthma, bronchitis, hay fever, laryngeal spasms, emphysema, coughs, and colds (Zhong 1986; Zhong 1999).

Preparation of Extract:

Plant material was washed with water and then allowed to dry in shade for about 3 to 4 weeks. Dried plant materials were grinded by using the electronic grinder. The powder of the whole plants of *Euphorbia hirta* L. was extracted according to (Harborne and Baxter., 1995). The dried plants sample was powered and filed into the soxhlet using petroleum ether and methanol respectively. Almost all the chlorophyll and lipid was deposited on the side of the flask and removed carefully. The extracts were stored in refrigerator till any further use.

Experimental Animals:

Male and female Wistar rats of body wt. 200–215 gm were obtained from central animal house, Pinnacle Biomedical research Institute (PBRI). The animals were fed on standard pellet diet (Hindustan Lever, Mumbai, India) and water add libitum. The albino waster rats used in the present study were maintained in accordance with guidelines of the CPCSEA, India and the study approved by the ethical committee.

The diabetic rats (glucose level > 240 mg/100ml) were divided into

5 groups of 6 rats each.

Groups divide in a such way that –

Group I: Normal Vehicle

Group II: Streptozotocin control

Group III: Standard (Glibenclamide 600 µg/kg)

Group IV: Dose 200mg/kg

Group V: Dose 400 mg/kg

Induction of Diabetes

Diabetes was induced by Streptozotocin (S. D. Fine Chemicals Ltd., Boisa). Streptozotocin is a toxic glucose analogue, which selectively destroys insulin-producing cells in the pancreas (that is beta cells) when administered to rodents and many other animal species (Sikarwar *et. al*., 2009). Animals were fasted for 12 hours before the experiment. The animals were injected intraperitoneally (i.p.) at a dose of 60 mg/kg body weight streptozotocin freshly dissolved in sterile normal saline.

# 3. Results and Discussion

Evaluation of antidiabetic acitivity

The result obtained with diabetic rats treated with methanolic extract of *Euphorbia hirta* L. prompted us to perform a study with crude methanolice extract in view to determine the nature of active principle. The results of methanolic extract which are expressed as change in blood glucose levels are as shown in (Table 1 & Figure 1, 2, 3, 4).

The methanolic extract of whole plant of *Euphorbia hirta* L. showed significant ($p<0.05$) reduction in blood glucose levels. The blood glucose levels were reduced considerably within seven days of drug administration. Methanol extract

doses of 200 mg/kg and 400mg/kg reduced blood glucose levels when compare to diabetic control group. Maximum effect was shown by standarad drug Glibenclamide by lowering blood glucose efficacy all the time. The pretreatment with streptozotocin induces diabetes in rats and blood glucose levels were 225-294 mg/dl. After administration of the crude methanol extracts, the glucose levels were found to decrease significantly from 282.5mg/dl to 189.83mg/dl (200mg/kg), 296.16mg/dl to 159.83mg/dl (400mg/kg) on 0 day after drug administration i.e., on 7$^{th}$ day from 189.83mg/dl to 14$^{th}$ day 165.16mg/dl (200mg/kg), 159.83mg/dl to 144.66mg/dl (400mg/kg) on 21$^{th}$ day 132.83mg/dl (200mg/kg), 109.16mg/dl (400mg/kg).

***Table 1.*** *Showing effect of methanolic extract on blood glucose level (mg/dl) in normal and Streptozotocin-induced diabetic rats (E. hirtaLinn.).*

| S. No. | Treatment | Dose | 0 Day | 7 Day | 14 Day | 21 Day |
|---|---|---|---|---|---|---|
| 1. | Vehicle (Normal saline) | 10ml/kg | 85.73±8.51 | 87.43±7.82 | 88.48±7.96 | 89.25±7.45 |
| 2. | STZ Control | 60mg/kg | 262.166±13.67* | 267.33±14.47* | 271.83±14.41* | 275.5±13.30* |
| 3. | Glibenclemide | 600µg/kg | 265.3±22.19 | 174.33±13.54** | 122.5±7.09** | 98.5±8.93** |
| 4. | Extract D1 | 200mg/kg | 282.5±17.59 | 189.83±25.34** | 165.16±29.17** | 132.83±25.86** |
| 5. | Extract D2 | 400mg/kg | 296.16±16.36** | 159.83±18.66** | 144.66±13.70** | 109.16±17.63** |

All data represented in Mean ± SD, n=6, *p<0.001 as compared to Vehicle group, **P<0.001 as compared to STZ control

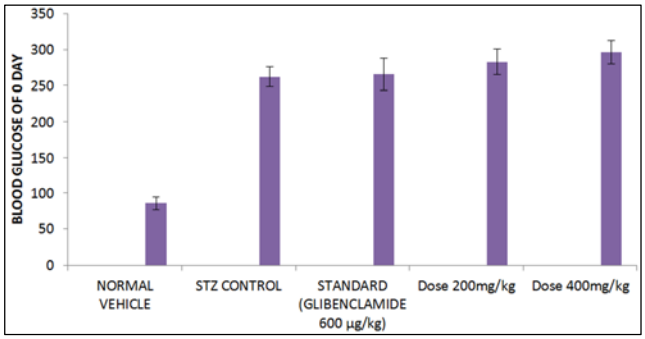


***Figure 1.*** *Showing blood glucose levels on day-0.*

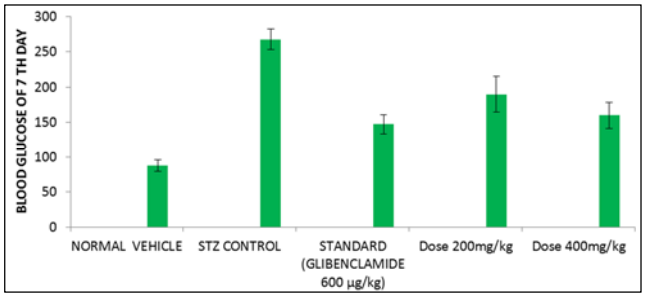


***Figure 2.*** *Showing blood glucose levels on day-7$^{th}$.*

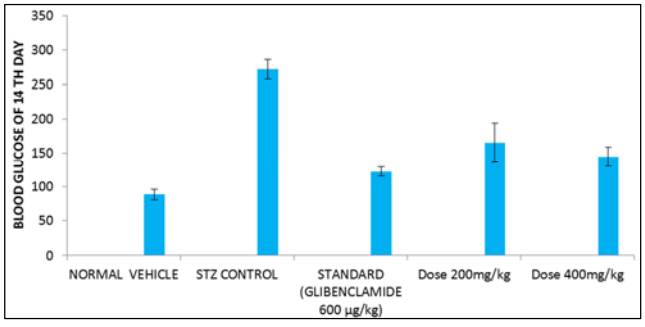


***Figure 3.*** *Showing blood glucose levels on day-14$^{th}$ day.*

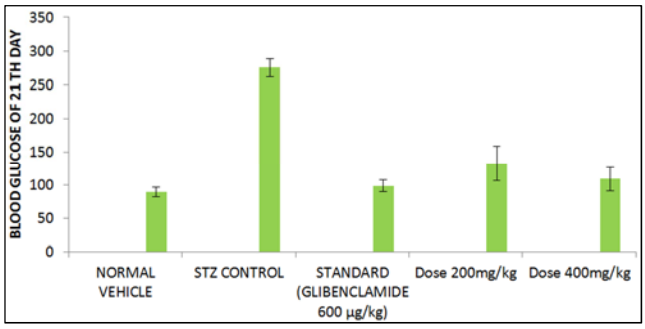


***Figure 4.*** *Showing blood glucose levels on day-21$^{th}$ day.*

## 4. Discussion

In the present study it was observed that on administration of Streptozotocin diabetes was induced which cause significant increase in blood glucose levels (Table 1 & Figure 1, 2, 3 & 4) (Arunachalam and Parimelazhagan, 2012). Blood glucose levels were higher than the normal levels which were 267.33±14.47, 174.33±13.54, 189.83±25.34, 159.83±18.66 in *Euphorbia hirta*L. After the administration of methanol crude extract of *Euphorbia hirta* Linn with doses of 200mg/kg b.w. and 400mg/kg b.w there was significant ($p<0.05$) decrease in blood glucose levels which were 132.83±25.86, 109.16±17.63 as compared to the diabetic control group blood glucose level i.e. 275.5±13.30 within 7 days of administration. Blood glucose level reduces and body weight also reduces. The results are in agreement with the view that blood glucose levels were reduced on administration of crude extract of *Euphorbia hirta* Linn (Matthew *et al.,* 2012; Ashish and Swapnil., 2011). The reduction in blood glucose level may be due to regeneration of β cells in pancreas which is in agreement with the view that regeneration of β cells causes reduction in blood glucose levels (Sabu and Kuttan*et al.,* 2004).

## 5. Conclusion

Diabetes is a metabolic disorder which results from pancreatic beta cells dysfunction & insulin resistance and are

characterized by hyperglycemia. The plant *E. hirta*was chosen to find its antidiabetic efficacy against streptozotocin induced diabetic rats. The result of the present study confirmed that the methanolic extract of *E. hirta*possess significant antidiabetic activity *in vivo,* this shows that the *E. hirta* has the potential for the development of drugs in combating diabetes.

# References

[1] Satyanarayana, U., Chakrapani, U., (2004). Biochemistry second edition. pp. 669.

[2] Conget, (2002). Diagnosis, classification and pathogenesis of diabetes mellitus. Rev. Esp. cardiol, 55(5): 528-35.

[3] Harbrone, S. B., Baxter, H., (1995). Phytochemical Dictionary. A handbook of bioactive compounds from plants Taylor and Francis, London.

[4] Sikarwar, M. S., Patil, M. B., Kokate, C. K., Sharma, S., and Bhat, V., (2009). Antidiabetic activity of *Neriumindicum* leaf extract in alloxan-induced diabetic rats. Journal of young pharmacist. 1(4): 330-335.

[5] Arunachalam. K., Parimelazhagan, T., (2012). Antioxidant properties from methanol extract of *Ficustalboti* bark on diabetic rats induced by Streptozotocin. Asian pac. Journal of Reproduction. 3(2), 97-105.

[6] Matthew, O., Olusola, L., and Oluwole, A. M., (2012). Preliminary study of Hypoglycaemic and Hypolipidemic activity of aqueous root extract of *Ricinus Communis* in Alloxan-Induced Diabetic Rats. Journal of Physiology and Pharmacology Advances. 2(10): 354-359.

[7] Ashish, B., and swapinal, G., (2011). Hypoglycaemic effect of polyherbal formulation in Alloxan Induced Diabetic Rats. Pharmacology online. 3, 764-773.

[8] Sabu, M. C., and Kuttan, R., (2002). Anti-diabetic activity of medicinal plants and its relationship with their antioxidant property. J. Ethanopharmacol., 81: 155-160.

[9] O. H. Osmani, D. S. Sekar, K. L. Senthil Kumar, R. K. Sahu, A. Roy, ( 2009) Biomedical and Pharmacological Journal, 2(2): 339-343.

[10] M. B. Krishna, S. Nammi, M. K. Kota, R. V. Krishna Rao, N. Koteswara Rao, A. Annapurna, (2004) J. Ethnopharmacol, 91: 95-98.

[11] U. Sharma, R. K. Sahu, A. Roy, D. K. Golwala, Journal of Young Pharmacists 2010, 2(3): 255-260. [4] D. Loew, M. Kaszkin, Phytother. Res., 2002, 16: 705-711.

[12] El-Mahmood MA. (2009). Antibacterial activity of crude extracts of Euphorbia hirta against some bacteria associated with enteric infections; 3(7): 498-505.

[13] Kumar S, Malhotra R, Kumar D. (2010) *Euphorbia hirta* L: Its chemistry, traditional and medicinal uses, and pharmacological activities; 4: 58- 61.

[14] Anozie VL. (1981) God's healing power in plants. Clin Pharm Herb Medium; 7: 23-25.