



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH

An official Publication of Human Journals

ISSN 2349-7203




Human Journals

Research Article


June 2015 Vol.:3, Issue:3

© All rights are reserved by Ranjit Kumar et al.

## Hepatoprotective and Hypoglycemic Effect of *Aloe vera* on Streptozotocine Induced Diabetic Mice



IJPPR  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals



ISSN 2349-7203

**Ranjit Kumar, Sunil Kumar\*, Nandjee Kumar\*, Md. Ali, and Arun Kumar**

*Mahavir Cancer Institute and Research Centre  
Phulwarisharif, Patna (Bihar) 801505,  
\* Department of Biochemistry, Magadh University,  
Bodhgaya, India*

**Submission:** 1 June 2015  
**Accepted:** 7 June 2015  
**Published:** 25 June 2015

**Keywords:** SGPT, SGOT, ALT, Insulin, Streptozotocine

### ABSTRACT

Diabetes mellitus is a clinical syndrome involving heterogeneous group of disorders, characterized by abnormally high blood glucose concentration, due to relative or absolute deficiency of insulin or resistance of the body cells to the action of insulin, often associated with altered metabolism of carbohydrate, protein and lipid with an increased risk of vascular and renal diseases. Traditional plant medicines or herbal formulations might offer a natural key to unfold diabetic complications. Aloe vera is an herb distributed throughout the world. The herb is used internally to combat most digestive problems, including constipation, poor appetite, colitis, irritable bowel syndrome as well as, asthma, diabetes, immune system enhancement, peptic ulcers. Diabetes is induced by streptozotocine administration followed by administration of *Aloe vera* gel 20 mg/kg. b.w for 2 weeks, 4 weeks, and 8 weeks. Mice is sacrificed and serum is collected for glucose, SGPT, SGOT, ALP and Total protein assay. In diabetic group SGPT, SGOT, ALP and Total protein were increased in many folds. Aloe vera reduces blood sugar level to some extent. Least restoration was observed in S.G.P.T and S.G.O.T. While ALP and total protein level were restored effectively in aloe vera administered group of mice. It is quite clear from study that aloe vera reduces blood glucose level and total protein effectively but did not maintain liver function effectively.



[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## INTRODUCTION

Diabetes mellitus is a clinical syndrome involving heterogeneous group of disorders, characterized by abnormally high blood glucose concentration, due to relative or absolute deficiency of insulin or resistance of the body cells to the action of insulin, often associated with altered metabolism of carbohydrate, protein and lipid with an increased risk of vascular and renal diseases <sup>1</sup>. Diabetes mellitus is the major endocrine disorder <sup>2</sup>, responsible for renal failure, blindness or diabetic cataract <sup>3</sup>, poor metabolic control <sup>4</sup>. Oxidative stress is a condition associated with increased rate of cellular damage induced by oxygen and oxygen-derived oxidants commonly known as reactive oxygen species. In a normal situation, plasma contains antioxidant mechanisms, which are likely to quench these ROS and protect against any likely damage <sup>5</sup>. The plants are used in India has about 50,000 plant species and several thousands have been claimed to possess medicinal properties <sup>6</sup>. The active principles of many plant species are isolated for direct use as drugs or pharmacological agents <sup>7</sup>. Traditional plant medicines or herbal formulations might offer a natural key to unfold diabetic complications <sup>8</sup>.

Aloe vera is an herb distributed throughout the world. The herb is used internally to combat most digestive problems, including constipation, poor appetite, colitis, irritable bowel syndrome as well as, asthma, diabetes, immune system enhancement, peptic ulcers. The active components of aloe gel are polysaccharides <sup>9</sup> and glycoprotein <sup>10</sup>. Several medicinal plants exhibit antidiabetic activity, among these are a few species of *Aloe*. Previous reports showed antidiabetic activity of aloe extract <sup>11</sup>, latex and anthraquinones <sup>12,13</sup> and gel <sup>14</sup>.

Thus the present study is designed to study hepatoprotective and hypoglycemic potential of aloe vera in alloxan induced diabetic mice.

## MATERIALS AND METHODS

**Animals:** The mice were reared in our laboratory. The age group of mice selected for the study was 12 weeks old with 30±2 gm. b.w.

**Chemicals:** Streptozotocine, manufactured by Lobachem Pvt. Ltd., Mumbai was utilized for the experiment. Streptozotocine were administered at the rate of 100 mg/kg. b.w. intraperitoneally for induction of diabetes.

*Aloe vera* gel is administered to diabetic group of mice at the rate of 20 mg/kg. b.w for 2 weeks, 4 weeks, and 8 weeks.

**Study groups & sampling:** The control group of 6 mice received distilled water as drinking water. The 'treatment' groups (n=6) received streptozotocine 100 mg/kg b.w by intra-peritoneal method once followed by eight weeks administration of aloe vera (20 mg/kg/b.w/day). Animals were sacrificed after the scheduled treatment. Serum was collected for SGPT, SGOT, ALP, total protein and glucose estimation.

## RESULTS AND DISCUSSION

In control group of mice glucose level was  $83.00 \pm 2.30$  mg/dl. In diabetic group of mice it was  $327.0 \pm 7.21$  mg/dl. While in Aloe vera administered group of mice it was  $261.3 \pm 9.93$  mg/dl,  $207.3 \pm 7.79$  mg/dl and  $162.3 \pm 10.84$  mg/dl (Graph: I).

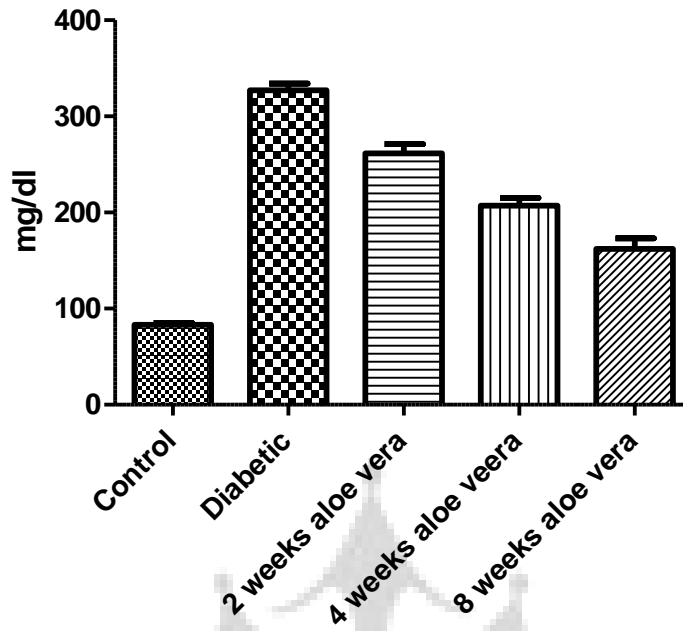
In control group of mice Serum Glutamate-Pyruvate Transaminase (S.G.P.T.) level was  $22.00 \pm 1.73$  U/L. In diabetic group of mice it was  $284.0 \pm 5.13$  U/L. While in Aloe vera administered group of mice it was  $209.7 \pm 4.80$  U/L,  $183.3 \pm 4.33$  U/L and  $103.0 \pm 5.50$  U/L (Graph: II).

In control group of mice Serum Glutamate-Oxalocetic Transaminase (S.G.O.T) level was  $25.00 \pm 2.30$  U/L. In diabetic group of mice it was  $78.67 \pm 4.33$  U/L. While in Aloe vera administered group of mice it was  $72.00 \pm 4.61$  U/L,  $55.33 \pm 3.84$  U/L and  $37.33 \pm 4.33$  U/L (Graph: III).

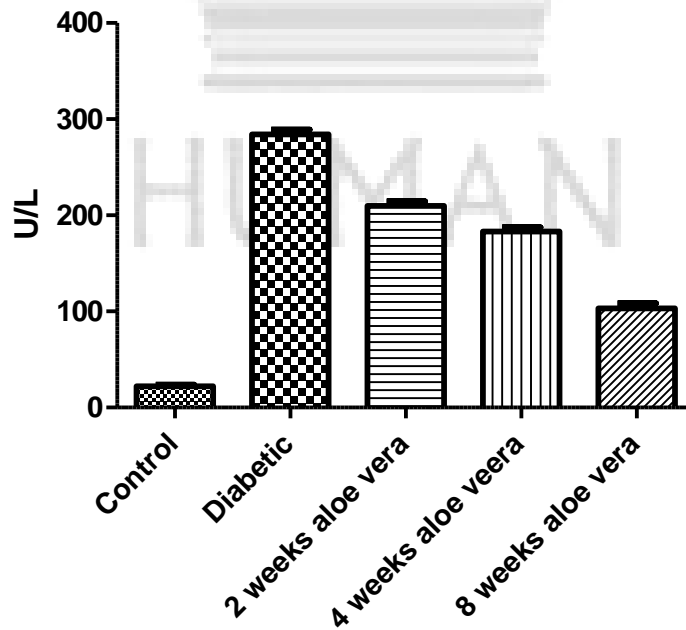
In control group of mice A.L.P. level was  $55.00 \pm 1.52$  U/L. In diabetic group of mice it was  $89.33 \pm 3.52$  U/L. While in Aloe vera administered group of mice it was  $77.33 \pm 2.90$  U/L,  $69.67 \pm 0.88$  U/L and  $61.67 \pm 5.23$  U/L (Graph: IV).

In control group of mice total protein level was  $6.833 \pm 0.23$  mg/dl. In diabetic group of mice it was  $14.77 \pm 0.29$  mg/dl. While in Aloe vera administered group of mice it was  $11.07 \pm 0.34$  mg/dl,  $9.267 \pm 0.34$  mg/dl and  $8.467 \pm 0.23$  mg/dl (Graph: V).

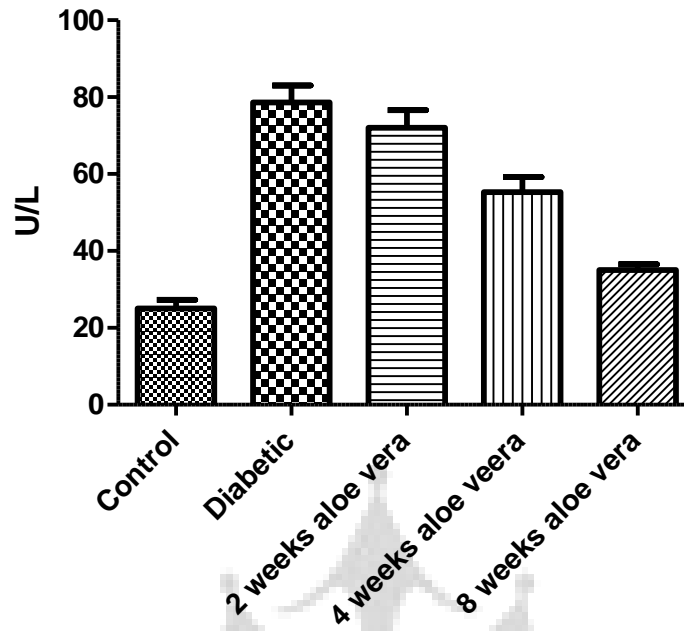
Graph - I: Glucose level in serum of mice



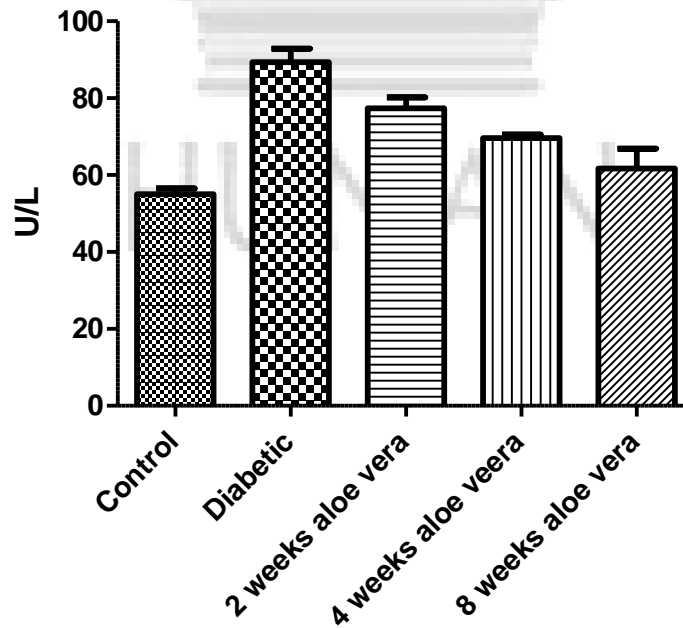
Graph - II: S.G.P.T. level in serum of mice



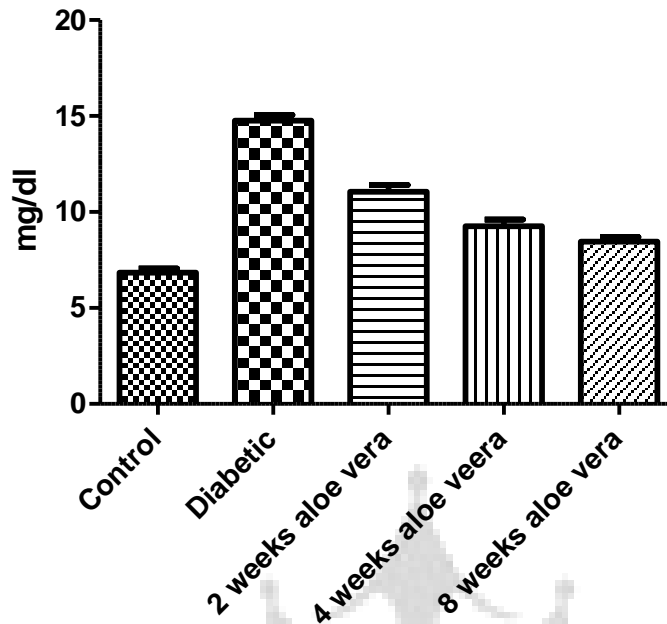
Graph - III : S.G.O.T. level in serum of mice



Graph - IV: A.L.P. level in serum of mice



Graph - V: Total protein level in serum of mice



Diabetes mellitus increases the production of free radicals which cause damage to cellular proteins membrane lipids & nucleic acid & in long-term it triggers cell death pathway<sup>15,16</sup>. In present study lipid peroxidation was also observed which is increased. Glucose level was increased many folds in present study. In present study S.G.P.T, S.G.O.T, A.L.P and Total protein were increased many folds.

In diabetes blood urea level increases & reason behind this is due to enhanced catabolism of both liver & plasma proteins. Cinnamon has hepatoprotective effect against liver injury & oxidative stress<sup>17</sup>. Many recent scientific investigations have also confirmed the efficacy of plant preparations, few of which are remarkably effective<sup>18</sup>. Aloe gel in streptozotocine-induced diabetic rats: both fresh and preserved aloe gel produced antihyperglycemic activity when the rats were given one tablespoonful, twice a day for at least one week<sup>19</sup>. In present study restoration were observed in S.G.P.T, S.G.O.T., A.L.P. and Total protein was also restored effectively in aloe vera administered group of mice.

Oxidative stress in DM was thought to be a result of free radicals generated during autoxidation of glucose<sup>20</sup>. Increased levels of ROS in type 2 DM was implicated to contribute to a hypercoagulable state<sup>21</sup>, and, most recently, evidence was provided for the accumulation of

oxidation products prior to the development of diabetes<sup>22</sup>. The causes of enhanced free radical production are hyperglycemia<sup>23</sup>.

## CONCLUSION

Thus it is concluded from study that aloe vera reduces blood sugar level to some extent. Least restoration was observed in S.G.P.T. and S.G.O.T. While ALP and Total protein level were restored effectively in aloe vera administered group of mice. It is quite clear from study that aloe vera reduces blood glucose level and total protein effectively but did not maintain liver function effectively.

## ACKNOWLEDGMENT

The authors are thankful to Mahavir Cancer Sansthan for providing infrastructural facility during this work. We are thankful to our entire research team who provided us every support during this study.

## REFERENCES

1. Harvey, R.A., Champse, P.C. 2009 Edited Lippincott's illustrated Reviews: Pharmacology. 4th ed. Netherlands: Wolter Kluwer Publishers; 287-96.
2. Burke, J. P. et al.(2003), Diabetes Care, 26:7 [PMID: 12832302].
3. Thylefors B., (1990), The WHO program for the prevention of blindness. Int. J. of Ophthal.14:211.
4. Donnelly R., et. al.(2000), BMJ, 320:1062 [PMID: 10764371].
5. Gil-Del Valle, L., Milian Lde, L., Toledo, A., Vilaro, N., Tapanes, R. and Otero, M.A. (2005). Altered redox status in patients with Diabetes Mellitus Type I. Pharmacol. Res. 51(4), 375-380
6. Grover J. K. et al, (2002) J Ethnopharmacol., 81:81 [MID: 12020931].
7. Fabricant D. S. & N. R (2001). Farnsworth, Environ Health Perspect, 109:69 [PMID: 11250806]
8. Nammi S. et al., (2003), BMC Complement Altern Med., 3:4 [PMID: 12950994]
9. Hikino, H., Teruaki, 5., Kawanishi, H.( 1986): Method of treating hypoglycemia using aloe polysaccharides. U.S. Patent 4, 598, 069.
10. Beppu, H., Nagamura, Y., Fujita, K.( 1993): Hypoglycemic and antidia-betic effects in mice of Aloe arborescens Miller var. natalensis Berger. Phytotherapy Res, 7: 537-542.
11. Kuraev, A. L., Aliev, R. K., Guseinov, G. A., Gadashev, A. G.(1958): Effect of certain plants on sugar tolerance. Izuest Akad Nauk Azerbatsdhan. S.S.R., Ser Bioi I Sel'skokhoz. Nauk, 3: 81-02.
12. Ghannam, N., Kingston, M., Al-Meshall, I. A., Tariq, M.( 1986): The antidiabetic activity of aloes: preliminary clinical and experimental observations. Hormone Res, 24: 288-94,.
13. Ajabnoor, M. A.( 1990): Effect of aloes on blood glucose levels in normal and alloxan diabetic mice. J. Ethnopharmacol, 28: 215-20.
14. Agarwal, O. P. (1980): Prevention of atheromatous heart disease. Angiology, 36 (8): 485-92, 195.
15. Maritim A C ,Sanders R A , Watkins B . (2003) Diabetes, oxidative stress & antioxidants : A Review. J Biochem Mol Toxicol; 17:24-38.

16. Ferrari C K B, Franca EL, Honorio-Franca AC, Souto PC. (2008) Antioxidants under the scrutiny of science. *BMJ*;336:594.
17. Al-Attar A.M.(2007); Chemopreventive effect of cinnamon extract on carbon tetrachloride induced physiological changes in the frog, *Rana ridibunda* J. *Applied Sci*, 7:79-90.
18. Marles RJ, Farnsworth NR (1995) Antidiabetic plants and their active constituents. *Phytomedicine* 2: 133-169.
19. Bunyaphatsara, N., Chansrakaew, W., Pornchirasilp, S., Peungvicha, P., Chokechaijaroenporn, O. (1995): Antidiabetic effect of fresh and preserved aloe gel. *Thai J. Phytopharmacy*, 2 (2): 1-7.
20. Miyata T, van Ypersele de Strihou C, Kurokawa K, Baynes JW (1999) : Origin and significance of carbonyl stress in longterm uremic complications. *Kidney International*, 55:389-399.
21. Collier A, Rumley A, Rumley AG, Paterson JR, Leach JP, Lowe GDO, Small M (1992) : Free radical activity and hemostatic factors in NIDDM patients with and without micro albuminuria. *Diabetes*,41:909-913.
22. Matteucci E. and Giampietro O., (2000) : Oxidative stress in families of type 1 diabetic patients. *Diabetes Care*, 23:1182-1186, 2000.
23. Hammes H.B., Bartmann A, Engi L. and Wulforth P (1997): Antioxidant treatment of experimental diabetic retinopathy in rats with nicanartine. *Diabetologia*, 40:629-634, 1997.

