# Evaluation of Hypoglycemic Impact of Aloe Vera in Diabetic Subjects

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**Abstract:-**

➢ *Background:*
*Aloe vera* (*Aloe barbadensis Miller*) is renowned for its wide range of medicinal properties. In future this plant will be among the natural and richest sources of health due to presence of more than 200 biologically active compounds. Most of these biological properties have been attributed to inner gel of the leaves. *Aloe vera* has myriad of medicinal uses such as anticancer, anti-arthritic, anti-diabetic and anti-inflammatory effects. The use of *Aloe vera* is also encouraged for treatment of constipation, immune system deficiencies and gastrointestinal disorders and go immune system deficiencies.

➢ *Objectives:*
• To grow Aloe vera at home under natural conditions.
• To assess the impact of *Aloe vera* gel on HbA1c levels of human subjects

➢ *Methodology:*
Diabetic patients had been selected and divided evenly into three groups ($G_o$, $G_1$, $G_2$) having six members in each group. $G_1$ and $G_2$ were given 5mL and 10 mL of *Aloe vera* gel for four weeks in a fasting along with $G_o$. Blood sample had been taken from all individuals to perform HbA1c test at baseline 3 end of trial.

➢ *Results:*
Results depicted that administration of *Aloe vera* significantly ($P<0.05$) reduced HbA1c levels. Highest reduction was observed in $G_2$ group ($11.66\pm2.15$ to $9.41\pm1.83$) followed by ($9.33\pm3.53$ to$7.69\pm2.56$) reduction in HbA1c levels of $G_1$ group. While there was a slight increase in levels of control group ($7.75\pm0.16$ to $7.78\pm0.12$). Furthermore, total mean difference of all three groups also reduced significantly from initial to final ($133.76\pm3.37$ to $128.59\pm4.62$) during study period of four weeks.

➢ *Conclusion:*
Hence, *Aloe vera* is effective in controlling blood glucose levels of diabetic patients.

## I. INTRODUCTION

Diabetes mellitus is among a group of most prevalent and chronic metabolic disorders also referred as hyperglycemia caused by a defect in action and secretion of insulin or both (ADA, 2004). It results from reduced responsiveness to insulin by peripheral tissues and cessation or reduction in release of insulin in reaction to normal physiological stimuli (Balion *et al*., 2007). Diabetes is also known to contribute greatly to high morbidity and mortality rates worldwide. Total world's population of about 2.5-3% is afflicted with diabetes and in some countries this percentage has reached up to 7% or more (Bannier *et al*., 2002). Excessive thirst, increased urine output, weight loss, skin problems, hunger, yeast infections, fatigue, slow healing of wounds and numbness in toes and feet occurs in response to diabetes. Hyperlipidemia and Hyperglycemia are two main features of diabetes mellitus in which various vascular complications like neuropathy, atherosclerosis, and coronary artery diseases are experienced by patients (Sheetz, 2002). The metabolic abnormalities associated with diabetes lead to excessive production of superoxide in the myocardium and endothelial cells of blood vessels. Therefore, oxidative stress plays a main role in the occurrence of diabetes related cardiovascular and microvascular complications (Giacco *et al*., 2010). Various screening tests for diabetes have been proposed mainly involves oral glucose tolerance, HbA1c, blood glucose, urine glucose and fasting plasma glucose test (Krishna *et al*., 2018). Diabetes is becoming prevalent by number of factors such as physical inactivity, changed life style, stress, poor diet, and lack of awareness. It is also believed that diabetes is an indicator of persistent chronic and low-grade inflammation in the body. Inflammation is characterized as a cascade of processes that gets triggered in response to various pathological stimuli as well as tissue injury Exercise is known as key to management of diabetes (Phillips, 2011). It has been suggested by various guidelines that patient of type 2 diabetes should exercise of minimum 150 minutes. At least three times in a week resistance exercise must be performed as exercise leads to improved cardiovascular fitness, help in maintaining weight and improves sensitivity to insulin (Kenny *et al*., 2006).

*Aloe vera,* a member of *Liliaceae* family is a perennial and succulent plant having traditional medicinal properties due to which it is also known as healing plant (choi et al., 2001). The names of *Aloe vera* has been originated from an Arabic word *"Alloeh"* meaning bitter and a glossy substance

while meaning of *Vera* is true in Latin (Amar *et al*., 2008). Height of *aloe Vera* is 60-100cm having stemless long leaves or short stem. In Pakistan the plant is known as "Quargandal" (Serrano *et al*., 2006). The color of leaves is glaucous green and flower is imbricated yellow. Leaves have of 2-3 feet and width ranging from 3-5 inches as well as weight of leaves varies between 2-4 pounds. PH of *Aloe vera* is 5.4. The leaf of *aloe* has been divided into two main parts, outer green rind composed of vascular bundles and inner parenchyma which is colorless containing gel of *Aloe vera.* Major chemical components of *Aloe vera* include: saponins,amino acids, salicyclic acid, anthraquinones, enzymes, lignins, vitamins, monosaccharide, minerals, polysaccharides and phytosterols. It is also good plant source of vitamin B12 and micro-nutrients like magnesium, zinc, calcium, vit C, A and vit E all are crucial to healthy growth plus functioning of different systems of body. Aloe vera is known to provide five unique benefits to the body that includes. i. Penetration– *Aloe vera* possess ability to reach deepest tissues of body ii. Antiseptic – aloe has minimum 6 antiseptic agents which provides resistance against bacteria, viruses and fungi iii. Stimulates cell growth – aloe is known to stimulates the growth of new and healthy tissue iv. Settles nerves – it is known to has clearing effect on nervous system of body v. Cleanses – *Aloe* has detoxifying properties (Manvita *et al*., 2014). *Aloe vera* also has numerous other medicinal properties including anti-bacterial, anti-septic, antioxidant, astringent, anti-diabetic, anti-inflammatory and have anti-cancer effects. It is also used as an antidote for the treatment of constipation, dysentery, diarrhea, skin diseases, radiation injury, burns and stomach disorders (Gordon *et al*., 2001). *Aloe vera* juice due to its cooling, laxative and diuretic effects is also known to be used for treatment of various other conditions like amennorhea, dyspepsia, abdominal tumor, hepatopathy, haemorrhoidal congestion of stomach and spleen (Boolor et al., 2000). Juice as well as gel of *Aloe vera* is also known to have local actions like its application on skin increase healing of wounds, provide resistance against skin infection and make the skin more refreshing and smoother (Akpan et al., 2006). As *Aloe vera* possess anti- inflammatory properties it is also used for treatment of inflammation associated diabetes (Xie et al., 2017). It also has lung cancer protecting effects and it is only the plant-based food that provides resistance against lung cancer (Browall et al., 2005). *Aloe vera* exerts its protecting effects by boosting the immunity of patient that in result decreases vulnerability and increases survival time of the latter (Pommier et al., 2004). *Aloe vera* also serves as a functional food used in the preparation of healthy food drinks and beverages such as tea (Roa *et al*., 2008).

## II. OBJECTIVES OF CURRENT STUDY

➢ To extract *Aloe vera* gel from organic *Aloe vera* at home
➢ To assess the impact of *Aloe vera* gel on HbA1c levels of human subjects

## III. MATERIAL AND METHOD

### A. Plant Material
Fresh leaves of *Aloe vera* had been grown at home under natural conditions following standard protocols

### B. Preparation of Aloe Vera
Fresh stems of *Aloe vera* had been washed thoroughly to get rid of all forms of debris. The leaves were then sliced longitudinally to cut open the inner part of leaves. The gel in the leaves was scrapped into a clean bowel and blended to obtain a finer and liquefied form of the gel, *Aloe vera* juice. The juice had been refrigerated below $4^0C$ for preservation (Akhigbe *et al*., 2012).

### C. Human Study Paradigms
The bio evaluation was performed to investigate the neutraceutic worth of *Aloe vera* gel against diabetes. Before the commencement of study, human subjects had been selected from Allied Hospital Faisalabad on the basis of their medical history, current medications and lifestyle practice. The human trial had been conducted on three groups $G_o$ was control group and $G_1$ and $G_2$ had been given 5 mL and 10 mL of *Aloe vera* gel once daily on empty stomach in the form of gel for 4 weeks. Blood sampling was performed one day before the initiation of trial as well as after the termination to find out the effect of *Aloe vera* gel on HbA1c levels of diabetic and normal individuals.

### D. Blood Glucose Levels
HbA1C level of diabetic patients was determined by the method of (Gupta et al., 2011).

### E. Statistical Analysis
The data collected were tabulated and ten analyzed statistically through the software "STATISTICS 8.1". The analysis of variance technique ANOVA was applied by using level of significance (Steel and Torrie).

## IV. RESULTS

| Source of variation | Degrees of freedom | Sum of squares | Mean squares | F-value |
|---|---|---|---|---|
| **Time** | 1 | 31.118 | 31.118 | 12.365** |
| **Dose** | 2 | 47.237 | 23.618 | 9.385** |
| **Dose x Time** | 2 | 17.791 | 8.896 | 3.535* |
| **Error** | 30 | 75.501 | 2.517 | |
| **Total** | 35 | 171.647 | | |

Table 1:- Analysis of Variance Table of Data Regarding Hba1c Levels

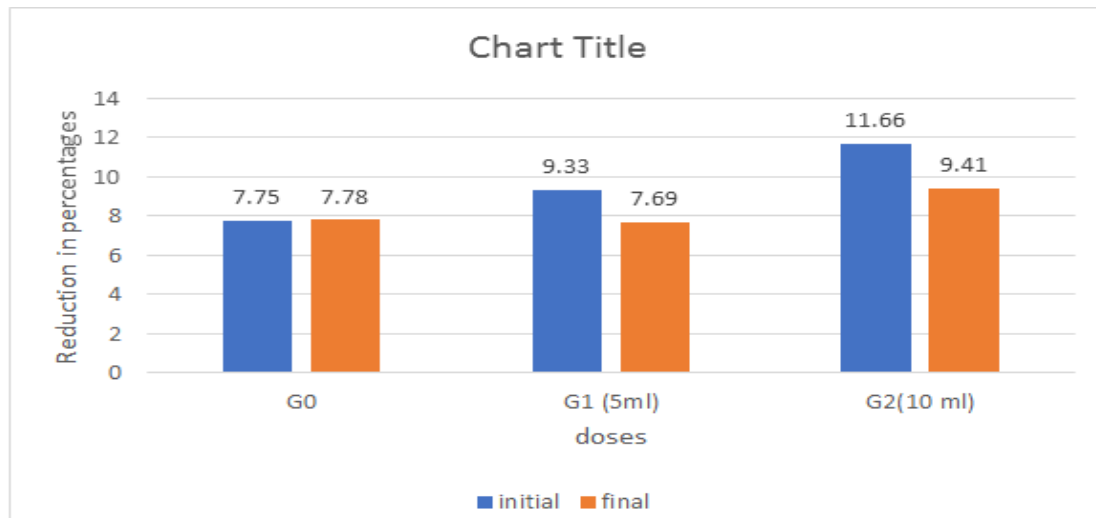\* =Significant (P<0.05) \*\* = Highly significant (P<0.01)

Fig 1:- Comparative Effect of Different Doses of Aloe Vera on Reduction in Hba1c Level of Patients

Graph showed that highest reduction was observed in $G_2$ (9.41%) who had been given 10 mL of Aloe vera followed by (7.69%) reduction in $G_1$ who had been given 5 mL of Aloe vera. While slight increase (7.78%) was observed in patients of control group.

## V.    DISCUSSION

Diabetes mellitus is among a group of most prevalent and chronic metabolic disorders also referred as hyperglycemia caused by a defect in action and secretion of insulin or both (ADA, 2012). Numerous pre-clinical (in animals) as well as clinical (in humans) experimental studies showed therapeutic effects of *Aloe vera* preparations in various forms e.g. (juice or as constituents in bread etc.) in reduction of blood glucose levels (Reynolds).

Keeping in view the above facts, the present study has been planned to investigate the effect of different doses of *Aloe vera* gel on glucose levels of blood in humans. Analysis of variance of data showed that all the levels of *Aloe vera* gel were statistically significant in reducing the blood glucose level of the patients, under study. Current study results revealed that highest reduction in blood glucose level of the patients of group 2 who had been given 10 ml of *Aloe vera* followed by significant reduction in blood glucose levels of patients of group 1who had been given 5ml of *aloe vera*. Findings of present study are close to (Riyanto *et al*., 2018) who reported that *Aloe vera* had showed a decline from 214.00 mg/dL to 97.53 mg/dL in their blood sugar levels after 4 weeks.  Results of this study are also supported by (Messiha *et al.,* ,2013) who used *Aloe vera* leaf pulp on rats and found that it was helpful in reducing diabetes in comparison with glimiperide in both *vitro* and *vivo*. Using single dose of intra peritoneal injection streptozotocin (50 mg/kg) diabetes had been induced in male albino rats experimentally. Conducted study findings are in line with the work done by (Saka *et al*., 2012) and (Mohammad *et al*., 2011) who observed that *Aloe*

*vera* gel was effective in reducing the sugar contents of the organism, under study. Current experiment out comes are in line with (Palmer *et al*., 2003) who found that the use of *Aloe vera* helps in reducing the blood glucose level by suppressing the activity of beta cells. Results are close to (Pigatto and Guzzi ,2005) who used *aloe vera* extract and noticed significantly reduced blood glucose level of the diabetic patients. Furthermore, (Huseini *et al*., 2011) also depicted that administration of *Aloe vera* gel did not only reduce fasting blood glucose levels, LDL cholesterol levels considerably but it also showed a significant reduction in HbA1c levels of blood.

## VI.    CONCLUSION

➢ The administration of *Aloe vera* gel have been resulted in significant reduction in HbA1c level of the patients under study.
➢ This therapeutic property of *Aloe vera* gel makes it a functional food
➢ Hence, it is concluded that beside the insulin, gel of *Aloe vera* can also be a better option in controlling the blood sugar levels

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