A Review on Anti – Hyperglycemic Effect of Aloe Vera

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Abstract
Diabetes mellitus is a chronic disease which is pointed by the higher levels of blood glucose from a shortcoming in insulin production, insulin action or both. The importantcharacteristicsincludeHyperglycaemia, hyperlipidaemia and oxidative stress which may be a huge risk for the creation of complications of Diabetes. This is said to be reduced by the administration of Aloe Vera in several forms and methods. Studies have been used to prove an anti-hyperglycaemic and anti-hyperlipidaemia effect of the Aloe Vera when administered in the humans and rats affected by DM. This literature review paper systematically compiles the research papers that provide data about the crucial effect of Aloe Vera in the Diabetes mellitus.

Keywords: Diabetes mellitus, Aloe Vera, Diabetes, Hyperglycaemia.

Introduction:

Diabetes Mellitus is a chronic disease featured by high blood sugar due to low insulin output, insulin action, or both. The important features of DM is hyperglycaemia, hyperlipidaemia and oxidative stress which shows a major risk factor of the growth of complications of diabetes. Worldwide, diabetes mellitus affects major populations. An essential strategy to prevent the diabetic complications and improving the quality of life in diabetic patients are effective domination of plasma glucose levels.

According to international diabetes federation, diabetes nowadays affects 536.6 million people, increasing to 12.2 % (783.2 million) in 2045. As per the Indian Council of Medical Research – Indian Diabetes (ICMR INDIAB) study circulated in 2023, the occurrence of diabetes is 101 million which 11 percent of the whole population. Impoverished management of diabetes results in long-term complications affecting the retina, kidney and also nervous system.

The use of conventional medicines in the process of metabolic diseases and the effects of diabetes causes additional issues due to the side effects and overpriced drugs. Therefore, alternative ways of treating diabetes should be found. The recommended, alternative treatment for diabetes is Nutritional therapy because it is easier to treat and less invasive. Many herbs, spices and other herbal products are used in the treatment of diabetes. A total of around 400 species were reported to display hypoglycaemic effect, but actually only few of these species has been investigated.

Aloe Vera which has been used for many decades for its curative and therapeutic qualities. The genus Aloe rise in arid, tropical, and subtropical areas, this genus composes around 450 species. Aloe vera is a widely distributed among Liliaceae plant in tropical areas, cosmetic and medical products are made from the mucilaginous tissue in the middle of the A. vera called A. vera gel. The peripheral bundle of sheath cells develops intensely bitter, yellow latex, commonly termed as aloe juice, or sap or aloes. Amino acids, anthraquinones,

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enzymes, minerals, vitamins, lignans, monosaccharide, polysaccharides, salicylic acid, saponins, and phytosterols are the major chemical constituents of Aloe vera. It has antibacterial, antifungal and antiviral properties which has the capability to treat hyperlipidaemia and psoriasis symptoms.

Aloe vera gel and skin are said to have the capability of anti-diabetic and cytoprotective activities that will lead to improve the diabetes and heart diseases. It has been noted that improve insulin sensitivity and control diabetes. Chromium and alprogen compounds found in aloe vera has the capability to treat pancreatic beta cell damage, improve the insulin resistance and decrease diabetes.

Aloe vera support lower cholesterol and triglycerides and increase high-density lipoprotein (HDL-C). Phytosterols (sitosterol, campesterol, and lupeol) are same in structure to cholesterol (Josias 2008).

Related Work:

- **Regulation of Glucose Metabolism:**
  Fasting plasma glucose level was able to reduce with the extract of Aloe vera gel with a concomitant rise of insulin levels and rejuvenate the islet cells of pancreas in both qualitative and quantitative manner.
  Clinical study has been reported that Aloe vera gel decrease insulin resistance, reversed impaired fasting glucose and also decrease fasting blood sugar and triglyceride levels.

- **Antihyperlipedemic Effect**
  Studies has been shown that there was a substantial rise of serum total cholesterol and triglycerides and a crucial decrease in HDL cholesterol in diabetic mice when it is compared to normal mice.

- **Antioxidant Activity**
  Studies have demonstrated that Aloe vera extracts can neutralize free radicals, decrease oxidative stress, and inhibit the output of pro-inflammatory cytokines. For instance, Aloe vera gel is shown a decrease the secretion of interleukin-8 (IL-8) and intracellular reactive oxygen species (ROS) in stressed human keratinocytes, highlighting its potential in skin wound management and anti-inflammatory treatments.

- **Wound Healing Property:**
  Enhanced Cell Proliferation and Migration: Aloe vera has been shown to significantly enhance the proliferation and migration of fibroblasts and keratinocytes, which are crucial for wound healing. A study demonstrated that Aloe vera treatments led to accelerated gap filling in scratch assays, indicating enhanced cell migration.

- **Anti Inflammatory Property:**
  The effects of Aloe vera contains compounds like acemannan, anthraquinones, and flavonoids which hold anti-inflammatory and the antimicrobial properties. These properties help reduce infection and inflammation at the wound site, promoting a more conductive environment for healing.

Materials and Methods Used:

Each of these studies find out the hypoglycaemic effect of the Aloe vera by administration of it through various modes, (e.g.: Aloe vera juice, Aloe vera gel). All of these experimental studies provide the necessary information and proof that the Aloe vera has the ability to reduce the blood glucose levels. Here are some evidences.

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The antidiabetic effect of AVCF (Aloe vera carbohydrate fraction).	**Examined using α-amylase, α-glucosidase inhibition, glucose diffusion and glucose uptake assay.**
Glucose-lowering effect of Aloe vera. Management of hyperglycaemia and hyperlipidaemia using A. vera.	**By in-vivo approaches via restoration of lipoprotein metabolism and glucose homeostasis. Case-control studies and randomised or controlled clinical trials were undergone.**
Anti-diabetic effect of leaf latex extract of A. megalacantha at three different doses.	**Administered to diabetes induced Swiss albino mice, the Fasting blood glucose levels (BGLs) measured by glucose-oxidase and peroxidase reactive strips.**
Impact of Aloe vera juice on type 2 diabetes mellitus	**Examined through a quasi-experimental research method. Glucometer has been used for evaluation and also recorded in a daily record sheet.**
Antioxidant capacity of leaf latex of Aloe vera.	**Evaluated through DPPH (2, 2-diphenyl-1-picrylhydrazyl) assay tested on mice and evaluated by glucometer.**
Reduction in blood glucose level by administration of Aloe vera gel powder capsules.	**Assessed through recording the fasting and post prandial blood glucose levels on three groups of subjects with varying quantity of A. vera gel powders.**
Restoration of blood glucose level to normal level by administration of Aloe vera extract.	**In STZ-induced diabetic rats on pancreatic islets by morphometric analysis was evaluated on four groups of six rats each.**
The anti-diabetic activity of A. vera extract when administered to the rats.	**Parameters used of verification include, blood glucose, insulin, creatinine, TG, TC, LDL, and HDL stages were using the serum of rats and the MDA and GSH stages from RBC hemolysate.**
The hypoglycaemic effect of aloe vera gel the high molecular weight fractions (AHM) has been received from 15 patients (9 males and 6 females).	**The analysis of parameters was by fasting blood glucose (FBG), HbA1c, triglycerids, cholesterol, AST, ALT, samples were received every week.**

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Randomized double-blind placebo-controlled clinical trial with hyper lipidemic type 2 diabetic patients.	**Fasting blood glucose, HbA1c, total cholesterol and LDL levels were evaluated and compared patient with placebo group.**

Results of the Studies:

1. AVCF advised streptozotocin-induced diabetic rats showed tremendous fall in fasting plasma glucose, glucagon and glucose-6-phosphatase stages with a concomitant rise in the insulin, hexokinase, and glycogen synthase levels and, glycogen content.
2. A positive effect on lipoprotein levels in diabetics has been shown an enhance glycaemic control. This can be accomplished through medications/therapeutic and lifestyle changes including intake of Aloe vera.
3. Oral administration of A. megalacantha leaf latex extract at doses of 100,200 and 400mg/kg daily for fourteen days results in a tremendous decline in fasting BGL as examined to negative control STZ-induced diabetic mice.
4. Intake of Aloe vera juice shows a tremendous change in the post-test marks on the stages of blood glucose of 60 diabetic patients.
5. In normal mice after the 4 hours all doses of the leaf latex induced hypoglycaemic changes. In week one Blood glucose stages of diabetic mice showed tremendous fall on and week two in a STZ-induced diabetic mouse model.
6. FBG level reduced by 11.4% and 15.4% and in the subjects after the study post prandial glucose level rise by 18.5% and 27.8% (the subjects were grouped into 3 groups among them group 2 and 3 were increased with 100,200mg of Aloe vera gel respectively for 3 months)
7. Oral administration of Aloe vera extract (300mg/kg) every day to diabetic rats for 3 weeks which showed restoration to normal blood glucose levels with concomitant increase in insulin stages upon feeding with Aloe vera extract in STZ-induced diabetic rats.
8. Aloe vera gel extract from oral consumption for 4 weeks caused a significant fall in the fasting serum glucose stages of the rats.
9. From 6 weeks of the start of the study AHM produced significant decrease in blood glucose level sustained. Drastic fall in triglycerides was only observed 4 weeks after treatment and simultaneously continued thereafter.
10. The level of fasting blood glucose has been lowered with the help of Aloe vera gel, HbA1c, total cholesterol and LDL stages significantly.

Conclusion:

This paper systematically emphasizes the important highlights of the anti-diabetic effect of Aloe vera, and various methodological approaches by which the studies has been done through the years, and the results effected in decrease of blood glucose levels. The review paper is a compilation of the research studies that provides necessary information about the effect of Aloe vera.

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