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# Overview of Diabetes and Diabetic Wounds

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**ABSTRACT**

*Diabetes mellitus is a complex metabolic disorder which has become a critical health issue in the modern age. The number of patients suffering from diabetes and related complications are increasing regularly reaching 381 million in the year 2013 according to the International diabetes federation (IDF). By 2030 this number is estimated to be doubled. This paper reflects overview of diabetes and diabetic wounds.*

## 1. Introduction

Diabetes is characterized by hyperglycemia resulting from abnormalities in glucose metabolism. In diabetic situation either body is not able to use insulin or there is not enough insulin in the body to control blood sugar level. The chronic condition of high blood sugar may result to serious complications. Physiological changes in the tissue and cells may delay healing. Additionally, complications due to diabetes also have an influence that directly or indirectly affects healing of wounds.

## 2. Diabetes and diabetic wounds

The diabetes can cause molecular and cellular abnormalities like connective tissue abnormality including loss of integrity, weak tensile strength and decreased elasticity. Abnormal cellular functions related to diabetic wounds include delayed inflammation, altered repair and regeneration of blood vessels, decreased collagen synthesis and defective macrophage function.

Diabetic wounds are also prone to infections due to alteration in granulocytic function and cellular chemotaxis. As per the report of American diabetes association, 25% of people with diabetes will suffer from a wound problem during their life period and it has been estimated that amputation of lower limb in diabetic patient accounts for more than 60% of all amputations performed , as per report of World Health Organisation.

The effect of hyperglycemia on wound healing is a very complex issue, continues to leave many questions unanswered. Diabetic wound heals slowly and worsens very quickly , resulting close monitoring. Diabetes affects the wound healing by slowing down the process or prolonging the healing process. There are mainly three factors- poor circulation, peripheral neuropathy and dysfunctional immune system .

Diabetic neuropathy is another important factor that influence wound healing and is one of the main causes of chronic diabetic wounds . When blood glucose level is uncontrolled, nerves in the body are affected and patient can develop loss of sensation, this phenomenon is called diabetic neuropathy. When there is a loss of sensation, the patient may not be able to feel a change in the status of a wound or the actual severity can progress leading to complications with the healing. Dysfunctional immune system is also an important factor for impaired or delayed wound healing in diabetics. Infection raises many health concerns and also slows the overall healing process. Carbohydrate is the primary energy source for cells, including those involved in wound healing. Impaired utilization of carbohydrate due to hyperglycemia leads to more proteolysis, glycogenolysis and subsequent decrease in wound healing.

Hyperglycemia also leads to osmotic diuresis and loss of water and electrolyte which negatively impact wound healing by decreasing tissue oxygenation. There are so many other indirect factors that can contribute to slowing down the healing process and metabolic abnormalities leads to inadequate migration of neutrophils and macrophages to the wound along with reduced chemotaxis, and such cellular changes predispose individuals to an increased risk of wound infection.

People with diabetes are more susceptible to wounds and slow healing rate. Lack of insulin production or use interferes with cell growth and energy production, reducing the body's ability to heal. Thus, people whose diabetes is uncontrolled are at increased risk of contracting skin infection if a cut or puncture is exposed to bacteria, a fungus or yeast. They also tend to have dry, itchy skin, which can lead to scrapes and cuts. Complication from clogged arteries, another diabetes linked condition can lead to infectious wound as well. Of the five million Americans who suffer from chronic diabetic wound 15% of these people are people with diabetes. Diabetes foot ulcer is the most common type of chronic wound and can lead to lower extremity amputation. Foot ulcers are open wounds that can develop at the sides, top or sole of the feet. Anyone who has diabetes can develop foot ulcers, people with diabetes are prone to foot ulcer or wound due to decreased circulation to their lower extremities.

Research on wound healing drugs is one of the developing areas in modern biomedical sciences. The screening of herbal extracts, is of great interest to the scientists for discovering new effective drugs. Several reports concerning antibacterial, anti inflammatory and wound healing activity of several plants are reflected in the literature but the vast majority is yet to be explored. Several reports on pharmacology are available on plants employing different wound models and related molecular mechanism for validating their traditional claims and developing

safe effective and herbal drugs for wounds which are accepted all over world.

The application of plant extracts and phyto-chemicals , associated with antimicrobial properties , well known may be significance enough in therapeutic treatment of diabetic wounds.

### 3. Conclusion

Major phytochemicals like vitamin A, C, E, and K carotenoids, flavnoids, polyphenols, alkaloids, tannis, saponins, pigments and enzymes, minerals have antimicrobial and antioxidant activities . Extensive screening of plants for wound healing activities has reflected good results on animal models. These plant products affect the various phases of wound healing and are apparently independent but interlinked. Some plant products are already in usage as effective antimicrobial wound healing agents. Isolation of active principle of these plants may provide precursors or templates upon which new and safe synthetic drugs can be produced.

Few years have observed exponential growth in the field of herbal medicine and the resultant drugs have got popularity both in developing and developed countries due to their natural origin, less side effects, better acceptance to common people. But there is a need of safe, economic and effective wound healing agent for the diabetic wound management. Herbal formulations containing herbal extract is gaining importance because of its safe and effective results.

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