

The Protective Effect of *Aloe Vera* (*Aloe barbadensis* L) Leaf Extract on Red Blood Cell Membrane Stability in Blood Samples Exposed to Sulfasalazin

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Abstract: *Red blood cells membrane stability is important index for RBCs stability and function. There are medicinal plants enhancing RBC membrane stability. The present study was exerted to investigate the effects of hydro-alcoholic extract of Aloe vera on red blood cell membrane stability. Our findings show that Aloe vera extract has improving effects on RBC membrane stability.*

Keywords: *Aloe vera, RBC, Membrane stability*

1. Introduction

There is extensive literature on the role of lipid peroxidation in cellular toxicity. Cell membranes play an important part since lipids are essential constituents. Unsaturated lipid hydro peroxides comprise the principal actors that supply ROS. Oxidized LDL induced alterations in genes related to lipid metabolism, OS, inflammation and apoptosis. Florence (1995) noted that ROS cause lipid peroxidation in cell membranes and inactivate membrane bound enzymes.

Lipid peroxidation is the oxidative degradation of lipids. It is the process in which free radicals "steal" electrons from the lipids in cell membranes, resulting in cell damage. This process proceeds by a free radical chain reaction mechanism. These radicals that play a role in various diseases can be countered by use of AOs.

Primary free radicals generated under oxidative stress in cells and tissues produce a cascade of reactive secondary radicals, which attack biomolecules with efficiency determined by the reaction rate constants and target concentration. At high concentrations, free radicals and radical-derived, nonradical reactive species are hazardous for living organisms and damage all major cellular constituents. These radicals that play a role in various diseases can be countered by use of AOs.

Sulfasalazine (Azulfidine) belongs to a class of drugs called sulfa drugs. It is a combination of salicylate (the main ingredient in aspirin) and a sulfa antibiotic. Sulfasalazine is in a class of medications called anti-inflammatory drugs. It works by reducing inflammation (swelling) inside the body. Sulfasalazine is also known as a disease modifying antirheumatic drug (DMARD), because it not only decreases the pain and swelling of arthritis, but also may prevent damage to joints. DMARDs work to decrease pain and inflammation, reduce/prevent joint damage, and preserve joint mobility. So, Sulfasalazine treats swelling, pain and stiffness in arthritis. However, it is not entirely clear how this medication works for rheumatoid arthritis. Taking sulfasalazine can create free radicals act as a membrane lipids caused by damage to red blood cell membrane stability.

Studies have revealed that several herbal derived drugs have been demonstrated to contain principles that possess ability to facilitate the stability of biological membranes.

Aloe Vera is being widely used in herbal medicine as antibacterial, antiviral, antifungal, anti-inflammatory and antioxidant agent. It is also used as topical application for many skin diseases; its antidiabetic effect in rats is also reported; thus its extract can be used for the treatment of anemia and immune deficiency problems. Aloe Vera, derived from an Arabic word “Alloeh” means shining bitter substance and vera means “true”. Aloe Vera looks like a cactus but it isn’t – the plant is a member of the lily family. Inside the leaf is a jelly-like substance. Early users of Aloe Vera discovered that when the jelly was applied to a wound, it would heal faster – a remarkable feat in a time, long before anti-biotic ointments, when the infection of a minor wound was often fatal. Descriptions and instructions for twelve different recipes for the internal and external uses of Aloe Vera can be found in an Egyptian relic, the Eberpapyrus, dating to around 1,500 BC. By 400 BC, the properties of Aloe Vera was well accepted from China to India. Today, Aloe Vera is cultivated throughout the world. A. Vera contains 99.5% water and 0.5% solids (Hamman, 2008). It contains 200 chemical compounds out of which 75 are biologically active, that is, aloin, Aloe polysaccharide (Jun et al., 2005), reducing sugars, organic acids, enzymes, metallic cations and lecithin (Eshun and He, 2004). Due to antibacterial properties, A. vera is used against commonly found bacteria including Staphylococcus, Streptococcus, Klebsiella, Pseudomonas, Escherichia coli, Salmonella, etc., (Lawrence et al., 2009). It is also used to treat many viral diseases and enhance immune system by acting as effective antiviral agent against human immunodeficiency virus (HIV) and hepatitis (Rabe et al., 2005). Research has investigated that A. Vera has positive influence on central nervous system, especially on the ependymal cells at ventricular zone (Rengin et al., 2008). Besides antibacterial and antiviral effects, A. Vera has antifungal, antineoplastic activities and widely used for topical applications as an antiaging agent (Ivan, 2006). A. vera significantly influences the function of liver and pancreas by influencing aspartate amino transferase (AST) and alanine transferase (ALT) (Iji et al., 2010). It has been reported that treatment of normal as well as diabetic rats with A. vera significantly reduces its blood sugar level indicating that it has antidiabetic effects (Rehman et al., 2011). The present study was exerted to investigate the effects of hydro-alcoholic extract of Aloe vera on red blood cell membrane stability [1]-[10].

2. Material And Methods

In this experimental study, blood samples from human were divided to control group and groups receiving sulfasalazine, and groups receiving “sulfasalazine+ *Aloe vera* extract”. Membrane stabilizing activity of each blood sample was calculated and the data were analyzed using ANOVA.

3. Results

The present study showed that sulfasalazine had destabilizing effect on RBC membrane stability ; However, appropriate doses of *Aloe vera* extract had protecting effects on RBC membrane stability and neutralized the effect of sulfasalazine.

4. Discussion

Sulfasalazine is a salicylate. It decreases inflammation. Sulfasalazine is used to treat bowel inflammation, diarrhea (stool frequency), rectal bleeding, and abdominal pain in patients with ulcerative colitis, a condition in which the bowel is inflamed. The findings show that taking sulfasalazine can create free radicals which in turn may damage red blood cell membrane stability.

The aqueous extract from A. Vera leaves contained naturally occurring antioxidant components, including total phenols, flavonoids, ascorbic acid, β -carotene and α -tocopherol. The extract exhibits inhibitory capacity against Fe^{3+} /ascorbic acid induced phosphatidylcholine liposome oxidation and superoxide anion radicals, and acts as reductant. In contrast, the leaf inner gel do not show any antioxidant activity. According to previous studies beneficial effects of *Aloe Vera* could be attributed to its antioxidant activity and could be related to the presence of phenolic compounds and antioxidant vitamins. Hence, due to antioxidant property of *Aloe vera* extract, it can improve red blood cell membrane stability [11]-[19].

5. Conclusion

Our findings showed that *Aloe vera* extract has improving effects on RBC membrane stability.

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7. References

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