Evaluation of Histopathological studies of *Achyranthes aspera* in mice, Swiss albino

Dr. K. Geetha
Department of Botany With Specialization In Plant Biotechnology
The Standard Fireworks Rajaratnam College For Women, Sivakasi, Tamilnadu, India.
(An Autonomous Institution affiliated to Madurai Kamaraj University, accredited with ‘A’ Grade by NAAC)

Abstract: Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. *Achyranthes aspera* L. (Amaranthaceae) is an indigenous medicinal plant of Asia, South America, and Africa. It is commonly used by traditional healers for the treatment of fever, especially malarial fever, dysentery, asthma, hypertension and diabetes. This paper explains evidence based-information regarding the histopathological activity of ethanol extract of *Achyranthes aspera* with alloxanised mice. A control group of mice with a number of six for each treatment were maintained. Mice were exposed to alloxan and then the alloxanised mice were administered with different extracts of *A. aspera* at a sublethal concentration of 12.5g/kg for a period of 30 days. After the exposure period the various tissues namely liver, spleen and muscle were taken from mice maintained as control, alloxanised mice and the lone effect of various extracts (hexane, butanol, ethanol, chloroform and water) of *A. aspera* on the alloxanised mice were processed for histological studies. Among the various extracts namely hexane, butanol, ethanol, chloroform and water in the extraction of *A. aspera* the ethanol extract exhibited a protective effect on the histology of liver, spleen and muscle of alloxanised mice. The hepatoprotective nature of ethanol extract of *A. aspera* as evidenced through the histological studies can be substantiated with the findings of marked restoration in the level of liver enzymes AST, ALT and ALP in alloxanised mice after administering with plant extract in the present study.

1. INTRODUCTION

Good health is a treasure that means it has value. When a nation is healthy, it saves more than it spends and the standard of living is high. However, when a nation is not enjoying good health, this kind of nation experiences a low level of education and political and economic problems. Histopathological alteration can be used as indicator for the effect of chemicals on organisms. Study on Histology appears to be a very sensitive parameter and is crucial in determining cellular changes that may occur in target organs (Priya Kannappan, 2009).

The liver is an important organ performing vital functions including bio transformation, migration of lipids, glycogen storage and release of glucose. Liver impairment is one of the leading causes of death in diabetes mellitus. The mortality rate due to hepatic dysfunction is greater than that of the cardiovascular complications. Liver, an insulin-dependent organ, plays a vital role in glucose and lipid homeostasis. It participates in the uptake, oxidation and metabolic conversion of free fatty acids and in the synthesis of cholesterol, phospholipids and triglycerides (Brixova, 1981; Moller, 2001). Spleen is the secondary lymphoid organ containing about one-fourth of the body’s lymphocytes and initiates immune responses to blood-borne antigens (Kuper *et al*., 2002; Nolte *et al*., 2002; Balogh *et al*., 2004). It brings about humoral and cell mediated immunity. Muscles are involved in contraction and relaxation and is the tissue receiving the major portion of blood supply. It is important that the therapeutic value of any isolated plant extract depends not only on its pharmacological potency but also on its lack of toxicity. This is important in the case of hypoglycemic drugs preparations.

Considering this in mind, the influence of various extracts of *A. aspera* on the histology of mice maintained as control and the impact of extracts on the recovering or repairing the histological alterations caused by alloxan in mice were investigated.

2. MATERIALS AND METHODS

A control group of mice with a number of six for each treatment were maintained. Mice were exposed to alloxan and then the alloxanised mice were administered with different extracts of *A. aspera* at a sublethal concentration of 12.5g/kg for a period of 30 days.

After the exposure period the various tissues namely liver, spleen and muscle were taken from mice maintained as control, alloxanised mice and the
lone effect of various extracts (hexane, butanol, ethanol, chloroform and water) of *A. aspera* on the alloxanised mice were processed for histological studies.

The collected specimen of the various organs from mice treated with different extracts of *A. aspera* were fixed in 10% buffered formalin solution then processed for histopathological studies in ascending grades of ethylalcohol, cleared in xylene, then embedded in paraffin wax. Sections of about 5-7 microns thickness were taken and then stained with hematoxylin and eosin (Drury and Wallington, 1967). The tissues were examined by a Nikon E600 light microscope and photographed by a Nikon DXM 1200 digital camera (Humason, 1972 and Bancrft et al., 1996).

3. RESULTS AND DISCUSSION

In the present study, histology of liver, spleen and muscle tissues of the mice maintained as control and the changes caused in the said tissues of mice treated with alloxan were observed. The amelioration effect of plant extract on the normal wellbeing of the alloxanised mice were observed. The amelioration effect of the *A. aspera* indicated its hepatoprotective nature. The hepatoprotection of *A. aspera* observed in the study may be due to the presence of phytochemicals such as flavonoids (quercetin), saponins (oleanolic acid), hydroquinone and aminoacids etc. It is also to be considered that the phytochemicals present in the ethanol extract of *A. aspera* are not only hepatoprotective but also non-toxic to mice. Similar conclusion was arrived in respect to non-toxic response of flavonoid content of *Artocarpus heterophyllus* by Chandrika et al., 2006.

**SPLEEN**

No histological alteration were observed in the spleen of mice maintained as control (Plate - 8). In alloxanised mice , cytoplasmic vacuolation, nuclear hypertrophy and degeneration of structural integrity of spleen were noticed (Plate - 9). Nuclear hypertrophy and infiltration of neutrophil were observed in alloxanised mice treated with various extracts of *A. aspera* in general (Plate - 10,11, 13 and 14). However, in alloxanised mice after exposing them to ethanol extract of *A. aspera* a tendency towards normal histological features of spleen was observed. (Plate - 12). The histology of spleen was affected to some extent by various treatments. Whereas the administration of ethanol extract of *A. aspera* to the alloxanised mice the integrity of spleen was found be normal as that of mice maintained as control. As mentioned in the introduction, the spleen is the sight of lymphoid organ and responsible for humoral and cell mediated immunity. In the present study the histology of spleen was protected in alloxanised mice particularly due to ethanol extract of *A. aspera*. It can be attributed to the immune potentiality of ethanol extract of *A. aspera*. This finding can be further substantiated by the result observed on the enhanced immunological response of cancer induced mice after treating with ethanol extract of *A. aspera*.

**MUSCLE**

No histological variation was observed in the muscle of mice maintained as control (Plate - 15). In muscle of alloxanised mice, severe infiltration of neutrophil was noticed (Plate - 16). No much variation was observed in muscle of alloxanised mice after individually treated with hexane and butanol extracts of *A. aspera* (Plate - 17 and 18). Muscle of alloxanised mice with ethanol extract of *A. aspera* a marked reduction in nuclear infiltration was seen (Plate - 19). Muscular atrophy was the result in alloxanised mice treated with chloroform extract of *A. aspera* (Plate - 20). In alloxanised mice after treating with water extract of *A. aspera* the muscle showed a reduction in neutrophil infiltration (Plate -
21). Similar observations were noticed by Manvi et al., 2010 in rat due to *Annona squamosa*. Plate 1 – 7 Histology of liver of Control mice and the various histopathological abnormalities due to alloxan and different extracts of *A. aspera*. Plate 5. Alloxan + Ethanol extract of *A. aspera*

Plate 1 – Control

Plate 2 – Alloxan treated

Plate 3. Alloxan + Hexane extract of *A. aspera*

Plate 4. Alloxan + Butanol extract of *A. aspera*

Plate 6. Alloxan + Chloroform extract of *A. aspera*

Plate 7. Alloxan + Water extract of *A. aspera*

Plate 8 – 14 Histology of spleen of Control mice and the various histopathological variations due to alloxan and different extracts of *A. aspera*. Plate 8 – Control

Plate 9 – Alloxan treated
Plate 10. Alloxan + Hexane extract of *A. aspera*

Plate 11. Alloxan + Butanol extract of *A. aspera*

Plate 12. Alloxan + Ethanol extract of *A. aspera*

Plate 13. Alloxan + Chloroform extract of *A. aspera*

Plate 14. Alloxan + Water extract of *A. aspera*

Plate 15 – 21 Histology of Muscle of Control mice and the various histopathological changes due to alloxan and different plant extracts

Plate 16 – Alloxan treated
4. CONCLUSION

Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. From the result of the present study it is obvious that the alloxanised mice showed histological alterations at various extents in the liver in particular, and also in spleen and muscle. Regarding the amelioration efficiency of various extracts of *A. aspera*, the ethanol extract of *A. aspera* is found to have better effect. Further, the ethanol extract of *A. aspera* is non-toxic to mice at this concentration and also helps to recover the damage caused by alloxan in the histological features of said tissues.

5. REFERENCE:


