Phytochemical Analysis and Hepatoprotective Activity of *Amaranthus spinosus* and *Moringa oleifera*

Amrita Kariyari[1],

[1](Research Scholar), Department of BioSciences, Barakatullah University Bhopal (M.P.) 462022, India

Abstract:

This study investigates the phytochemical composition and hepatoprotective potential of *Amaranthus spinosus* and *Moringa oleifera*. Extracts from both plants were subjected to comprehensive phytochemical screening to identify bioactive compounds. The hepatoprotective activity was evaluated using in vitro and in vivo models of liver injury. Phytochemical analysis revealed the presence of flavonoids, alkaloids, saponins, and phenolic compounds in both plant extracts. The extracts demonstrated significant antioxidant properties and exhibited protective effects against hepatotoxicity in experimental models. Treatment with the plant extracts resulted in reduced levels of liver enzymes, improved antioxidant status, and decreased histo pathological alterations in liver tissue. These findings suggest that *Amaranthus spinosus* and *Moringa oleifera* possess hepatoprotective properties, likely attributed to their rich phytochemical profiles. Further research is warranted to isolate and characterize the specific compounds responsible for these beneficial effects and to elucidate the underlying mechanisms of hepato-protection.

Key words: Hepatoprotective, Phytochemical screening, hepatotoxicity, antioxidant, histo pathological.

Introduction

Liver diseases remain a significant global health concern, with increasing incidence and mortality rates. The search for effective hepatoprotective agents has led researchers to explore the therapeutic potential of medicinal plants. *Amaranthus spinosus* (spiny amaranth) and *Moringa oleifera* (drumstick tree) are the two medicinal plants widely used in traditional medicine for their hepato-protective properties.

Phytochemical screening of A. spinosus and M. oleifera leaf extracts reveals a diverse array of bioactive compounds, including alkaloids,saponins,flavonoids and phenolic compounds. These phytocontituents contribute to the plants antioxidants,anti inflamantory and hepatoprotective activities , making them potential candidates for treating liver disorders.

The study aims to investigate the phytochemical profile and hepatoprotective potential of A.spinosus and M.oleifera leaves extracts, shedding light on their therapeutic applications and guiding further research into their mechanisms of action.

Materials and Method

Experimental plant

Amaranthus spinosus and *Moringa oleifera* leaves were collected from local market of Indrapuri Bhopal (m.p.)

Preparation of plant extracts

Both the plant leaves were collected from local market and washed in tap water, after that shade dried and powdered by grinder. 200 g of powdered weigh and dissolved in 250 ml distilled water and 250 ml of ethanol solvents for cold maceration process. After getting both plant extracts were filtered individually and evaporated to dryness at room temperature under the pressure of rotatory vacuum evaporator. The extract were collected as semi-solids and then subjected for qualitative phytochemical analysis.

The dried extract were properly stored in the refrigerator at 4°C for further investigations and experiments.

Phytochemical analysis:

Experiments were conducted for the analyzing, screening and identification of phytoconstituients in the form of secondary metabolites present in *Amaranthus spinosus* and *Moringa oleifera* plant extracts by using the standard procedures described.

Phytochemical Screening:

A. Detection of alkaloids: Alkaloids are a class of nitrogen-containing compounds found in plants, known for their diverse biological activities. Several tests can detect alkaloids in plant extracts as:

i. Mayer's Test: Filtrate were treated with Mayer's reagent (Potassium Mercuric iodide), cream colored precipitate indicates presence of Alkaloid.

ii. Wagner's Test: Filtrate were treated with Wagner's reagent (iodine in Potassium iodide). After treated reddish brown colored precipitate indicates presence of Alkaloid.

iii. Dragendroff's Test: Filtrate were treated with **Dragendroff's reagent** (Solution of potassium bismuth iodide**).** After treated reddish brown colored precipitate indicates presence of Alkaloid.

B. Detection of glycosides: 0.5 gm of extracts diluted to 5 ml of distilled water and add 2 ml of glacial acetic acid and add 1-2 drop of ferric chloride solutions and after that add conc. sulphuric acid were showed brown colored ring indicates the presence of glycosides.

C. Detection of Saponins:

i. Foam Test: Small amount of plant extracts were shaken with little amount of distilled water, if foam produced and persists for ten minutes it indicates the presence of saponins.

D. Detection of Flavonoids: Flavonoids are a class of plant compounds known for their antioxidant and therapeutic properties.

i. Alkaline Reagent Test: In small amount of plant extracts sodium hydroxide (NaOH) were added and a yellow color solution turns into colorless which indicated flavonoids presence.

ii. **Ferric Chloride Test**: In small amount of plant extracts Ferric Chloride ($FeCl_3$) solution were added and a green, blue and violet color indicates the flavonoid presence.

E. Detection of Tannins: Tannins are the type of polyphenolic compound found in plants known for their astringent and antioxidant properties. Several tests can detect tannins in plant extracts.

i. Ferric Chloride Test: In plant extracts add few drops of Ferric Chloride **(**$FeCl_3$) solutions a blue black, green or brown color indicates tannins presence.

Result and Discussion:

The present study of phytochemical analysis of *A.spinosus* and *M.oleifera* show the presence of secondary metabolites and phytoconstituients such as alkaloids, flavonoids, steroids, terpenoids, saponins, glycosides, phenols and tanins are the major compounds to be investigated and the results are present in table 1 and table 2.

Table 1: Screening of Secondary metabolites in *Amaranthus spinosus*

S.No.	Phyto-Chemicals	Test	Result
1.	Alkaloid	Wagner's Test	-
2.	Flavanoid	Ferric Chloride Test	+
3.	Glycoside	Glycoside Test	+
4.	Saponins	Foam Test	+
5.	Tanins	Ferric Chloride Test	+

Table 2: Screening of Secondary metabolites in *Moringa oleifera*

S.No.	Phyto-Chemicals	Test	Result
1.	**Alkaloid**	Wagner's Test	+
2.	**Flavanoid**	Ferric Chloride Test	+
3.	**Glycoside**	Glycoside Test	+
4.	**Saponins**	Foam Test	+
5.	**Tanins**	Ferric Chloride Test	+

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