IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

PHYTOCHEMICAL SCREENING AND EVALUATION OF HEPATPPROTECTIVE ACTIVITY OF LEAVES EXTRACT OF *CHLOROPHYTUM TUBEROSUM* PLANT

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ABSTRACT

Due to their possible pharmacological properties, which include antineoplastic, antimicrobial, antioxidant, anti-inflammatory, analgesic, anti-diabetic, anti-hypertensive, and antidiarrheal properties, medicinal plants have been employed in the treatment of a wide range of illnesses. The therapeutic value of a medicinal plant is determined by its phytoconstituents, either separately or in combination. Among the significant phytochemicals with a variety of biological activity are alkaloids, flavonoids, phenolics, tannins, saponins, steroids, glycosides, terpenes, etc. By identifying the phytochemicals in a plant, one can anticipate its pharmacological activity. Even though phytochemicals are now determined using a variety of contemporary methods, traditional qualitative assays are still widely used for plants' initial phytochemical screening.

Phytochemicals are the best remedies to all kind of diseases and disorders throughout the world. There are a lot of plants, and its sources are playing a role as a heart, liver and kidney savers. In our present investigation, the *chlorophytum tuberosum* leaves extract used for the hepatoprotective activity. The phytochemicals present in the hydroalcoholic leaves extracts were analyzed using preliminary biochemical analysis. The animals were divided into five groups, in that apart from the first group (normal control), group-2 are induced with Isoniazid. Group-3, group-4 were experimental group treated with *chlorophytum tuberosum* leaves extract 100 mg/kg and 200 mg/kg and group-5 treated with standard drug. The increasing of enzymes and bilirubin, triglycerides and cholesterol and decreasing protein shows the liver damage. These levels are changed into normal range indicates efficiency of our plant drug.

Keyword: *Chlorophytum Tuberosum*, Hepatoprotective Activity.

1. INTRODUCTION

Liver is the largest solid organ, the largest gland, and one of the most important organs. It serves as a hub for the metabolism of nutrients and the excretion of waste metabolites. According to Ozougwu and Eyo (2014) Prior to being distributed to the systemic circulatory system, its main job is to regulate the flow and security of substances absorbed from the digestive system (Allen, 2002). The liver is extremely important since a complete loss of function could result in death in a matter of minutes (Ozougwu, 2014)., in light of this, this study was conducted to examine the liver's physiology in order to preserve optimal liver function and excellent health in order to prevent liver damages such as fatty liver, liver fibrosis.

The ventral foregut definitive endoderm is where the cells that eventually make up the adult liver began their journey during development. The establishment of competence for liver formation is the first step in the many stages of liver development. Liver specification, hepatic bud creation, growth, and differentiation follow. The metabolic profile of the developing liver differs greatly from that of the adult phenotype during the liver's development and for a while following parturition. The liver undergoes several metabolic alterations both before and soon after birth. These alter the organism's capacity to digest xenobiotics while also enabling it to adjust to the intake of nutrients from meals. As the organism matures, with duration an adult pattern of metabolic enzymes develops. During the development of the hepatocellular carcinoma, frequently the gene expression pattern of the hepatocytes reverts to a more fetal-like stage.

Liver makes up 2.5% of an adult's body weight and weighs about 1500g. The liver's smooth, dome-shaped surface is connected to the inferior surface of the diaphragm's concavity. The thoracic cage and diaphragm conceal and shield the liver, which is mostly located in the right upper quadrant of the belly. The normal liver is located deep to the seventh and eleventh ribs on the right side and crosses the midline to reach the left nipple. The liver is comprised of four lobes: the right, left, caudate, and quadrate. The lobes that are largest are the right and left, while the lobes that are smaller and placed posteriorly. Anteriorly, two ligaments are apparent. The falciform ligament divides the left and right lobes superiorly. The round ligament, which extends somewhat from the liver, is inferior to the falciform ligament. The gallbladder is also evident anteriorly on the most inferior part of the right lobe. Many more intriguing structures can be seen on the posterior side. The caudate lobe is situated superiorly, almost midway between the left and right lobes. The inferior vena cava sulcus lies next to the caudate lobe. The porta hepatis, where the hepatic artery and hepatic portal vein enter the liver, is located directly inferior to the caudate lobe.The portal vein transports blood from the digestive system that is rich in nutrients. The bile duct, which returns to the gallbladder, is inferior to the porta hepatis. The hepatic vein is located inferiorly and next to the inferior vena cava sulcus, which is where post-processed blood exits the liver. A posterior mesenterial system holds the liver in place, and the falciform ligament connects it to the diaphragm. In addition, visceral peritoneum covers the majority of the liver.

2. Experimental Work

2.1 Plant material collection

Leaves of *Chlorophytum tuberosum* were collected from Vindhya herbalnursery Bhopal in the month of August, 2023.Drying of fresh plant parts were carried out in sun but under the shade. Dried Leaves of *Chlorophytum tuberosum* were preserved in plastic bags and closed tightly and powdered as per the requirements.

2.2 Extraction of Plant Material

Leaves of *Chlorophytum tuberosum* were shade dried at room temperature. The shade dried plant material was coarsely powdered and subjected to extraction with petroleum ether by maceration. The extraction was continued till the defatting of the material had taken place. 65 gm of dried powdered Leaves of *Chlorophytum tuberosum* has been extracted with Hydroalcoholic solvents (Ethanol 80%) using maceration process for 48 hrs, filtered and dried using vacuum evaporator at 40^0C. The percentage yield of each extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powder drug Taken}} \times 100$$

2.3 Phytochemical Screening

The *Chlorophytum tuberosum* extract acquire was subjected to the precursory phytochemical analysis following standard methods by Khandelwal and Kokate. The extract was screened to identify the presence of various active principles of alkaloids, glycosides, phenols, flavonoids, Terpenoids, Saponins, Steroids.

2.4 Estimation of total Phenolic, flavonoid and alkaloid Content

2.4.1 Total Phenolic content estimation

The total phenolic content of the extract was determined by the modified Folin-Ciocalteu method. 10 mg Gallic acid was dissolved in 10 ml methanol, various aliquots of 5- 25µg/ml was prepared in methanol.10 mg of dried extracted dissolve in 10 ml methanol and filter. Two ml (1mg/ml) of this extract was for the estimation of phenols. 2 ml of extract or standard was mixed with 1 ml of Folin-Ciocalteu reagent (previously diluted with distilled water 1:10 v/v) and 1 ml (7.5g/l) of sodium carbonate. The mixture was vortexed for 15s and allowed to stand for 15min for colour development. The absorbance was measured at 765 nm using a spectrophotometer.

2.4.2 Total flavonoids content estimation

Determination of total flavonoids content was based on aluminium chloride method.10 mg quercetin was dissolved in 10 ml methanol, and various aliquots of 5- 25µg/ml were prepared in methanol. 10 mg of extract dissolved in 10 ml methanol and filter. Three (1mg/ml) of this extract was for the estimation of flavonoid. 1 ml of 2% $AlCl_3$ methanolic solution was added to 3 ml of extract or standard and allowed to stand for 15 min at room temperature; absorbance was measured at 420 nm.

2.5 Isoniazid induced hepatoprotective activity of Leaves of *Chlorophytumtuberosum*

Wistar rats (180–250 g) were group housed (n= 6) under a standard 12 h light/dark cycle and controlled conditions of temperature and humidity (25±2 °C, 55–65%). Rats received standard rodent chow and water *ad libitum*. Rats were acclimatized to laboratory conditions for 7 days before carrying out the experiments. All the experiments were carried in a noise-free room between 08.00 to 15.00 h. Separate group (n=6) of rats was used for each set of experiments. Animals were kept fasting providing only water,

Leaves of *Chlorophytum tuberosum* (50,100,150,200,300 mg/kg/day) was administered orally for 4 days of six groups of rats (n=6) and the animals were kept under observation for mortality as well as any behavioral changes for evaluation of a possible hepatoprotective effect.

Experimental designs

Group –I: Normal control (Sterile distilled water ml/kg, p.o.)

Group –II: INH (Isoniazid) solutions were prepared in sterile distilled water (100mg/kg, p.o.)

Group -III: *Chlorophytum tuberosum* Extract (100mg/kg, p.o.) + INH (100 mg/kg,p.o.)

Group –IV: *Chlorophytum tuberosum* Extract (200mg/kg, p.o.) + INH (200 mg/kg,p.o.)

Group –V: Silymarin (2.5 mg/kg, p.o.) + INH (100 mg/kg, p.o.)

3. RESULTS AND DISCUSSION

3.1 Result of Percentage Yield

The yield of extracts obtained from different samples using hydroalcoholic as solvents are depicted in the table 3.1.

Table 3.1: % Yield of leaves extracts of *Chlorophytum tuberosum*

S. No.	Solvents	% Yield
1.	Hydroalcoholic	4.952

3.2 Phytochemical screening of extracts

The outcomes of the results are discussed separately in the table 3.2.

Table 3.2: Phytochemical screening of extracts of *Chlorophytum tuberosum*

S. No.	Constituents	Hydroalcoholic extract
1.	**Alkaloids**	
	Mayer's Test	**+ve**
	Wagner's Test	**+ve**
	Dragendroff's test	**+ve**
	Hager's test	**-ve**
2.	**Glycosides**	
	Modified Borntrager's Test	**-ve**
	Legal's test	**-ve**
3.	**Flavonoids**	
	Lead acetate	**+ve**
	Alkaline test	**+ve**
4.	**Phenolics**	
	Ferric Chloride Test	**+ve**

5.	**Proteins and Amino acids** Xanthoproteic test Ninhydrin Test	 **+ve** **+ve**
6.	**Carbohydrates** Molisch's Test Benedict's Test Fehling's test	 **+ve** **+ve** **+ve**
7.	**Saponins** Froth Test Foam test	 **+ve** **+ve**
8.	**Diterpins** Copper acetate test	 **-ve**

3.3 Results of estimation of total phenolic contents

Table 3.3: Total phenolic and total flavonoid content of *Chlorophytumtuberosum* extract

S. No.	Extract	Total Phenol(mg/100mg)	Total flavonoid (mg/100mg)
1.	Hydroalcoholic extract	0.927	1.06

3.4 Results of *In –Vivo* hepatoprotective activity of extract

Table 3.4: Effect of Hydroalcoholic extract of *Chlorophytum tuberosum* leavessand Silymarin on % SGOT levels in Isoniazid induced hepatotoxicity in rats.

S.N.	Treatment	Dose	SGOT (%)
1	Normal	1 ml/kg, p.o.	142 ± 2.5
2	INH	100 mg/kg, p.o.	317.37 ± 6.5
3	*Chlorophytum tuberosum Extract*	100 mg/kg p.o.	231.0 ± 3.5***
4	*Chlorophytum tuberosum Extract*	200 mg/kg p.o.	189.0 ± 3.9***
5	Silymarin	2.5 mg/kg p.o.	151.0 ± 2.6***

Table 3.5 : Effect of Hydroalcoholic extract of *Chlorophytum tuberosum* leavessand Silymarin on %SGPT levels in Isoniazid induced hepatotoxicity in rats.

S.N.	Treatment	Dose	SGPT (%)
1	Normal	1 ml/kg, p.o.	138.0 ± 2.50
2	INH	100 mg/kg, p.o.	315.0 ± 3.60
3	*Chlorophytum tuberosum Extract*	100 mg/kg p.o.	205.0 ± 4.20***
4	*Chlorophytum tuberosum Extract*	200 mg/kg p.o.	192.0 ± 3.40***
5	Silymarin	2.5 mg/kg p.o.	149.0 ± 3.70***

Table 3.6: Effect of *Chlorophytum tuberosum* Leavess and Silymarin on %serum bilirubin levels in Isoniazid induced hepatotoxicity in rats.

S.N.	Treatment	Dose	Serum Bilirubin (%)
1	Normal	1 ml/kg, p.o.	115.0 ± 5.50
2	INH	100 mg/kg, p.o.	282.0 ± 3.50
3	*Chlorophytum tuberosum Extract*	100 mg/kg p.o.	191.0 ± 4.51***
4	*Chlorophytum tuberosum Extract*	200 mg/kg p.o.	139.0 ± 1.60***
5	Silymarin	2.5 mg/kg p.o.	125.0 ± 4.50***

Table 3.7: Effect of *Chlorophytum tuberosum* Leavess and Silymarin on % ALP levelsin Isoniazid induced hepatotoxicity in rats.

S.N.	Treatment	Dose	ALP(%)
1	Normal	1ml/kg, p.o.	162±3.5
2	INH	100mg/kg,p.o.	317±5.5
3	*Chlorophytum tuberosum Extract*	100mg/kg,p.o.	219±4.50***

4	*Chlorophytum tuberosum Extract*	200mg/kg,p.o.	184±4.50***
5	Silymarin	2.5 mg/kg,p.o.	152±3.80***

Chlorophytum tuberosum leavess are an important medicinal plant which is used in traditional medicine to treat many diseases. The liver may be considered as the most important organ in drug toxicity for two reasons: on the one hand it is functionally interposed between the site of absorption and the systemic circulation and is a major site of metabolism and elimination of foreign substances; but on the other hand these features also render it a preferred target for drug toxicity. Drug- induced liver injury therefore poses a major clinical problem. Liver plays a major role in detoxification and excretion of many endogenous and exogenous compounds, any injury or impairment of its function may lead to several implications on one's health. Management of liver diseases is still a challenge to modern medicine. Increased in the level of activities of SGPT, SGOT and ALP in the blood reflect the damage of liver hepatocytes and indirectly impairment of liver functions following APAP-induced hepatotoxicity.

In Table SGPT, SGOT and ALP activities were significantly elevated ($p<0.05$) after administration of APAP. Treatments with 100 and 200 mg/ kg of *Chlorophytum tuberosum* Leavess extract significantly reduced the elevation of these enzymes ($p<0.05$). The reduction of liver enzymes was seen to be to the level of the control group and it was also similar to the level of group pretreated with silymarin. One of the hallmark signs of hepatic injury or damage is apparent leakage of cellular enzymes into plasma. In addition, the extent and type of liver injury or damage can be accessed based on the presence or absence of specific enzymes in the blood stream. In general measurement of alanine aminotransferase, aspartate aminotransferase and alkaline phosphatase are commonly used as marker enzymes in accessing APAP induced hepatotoxicity. In this study, hepatoprotective effect of *Chlorophytum tuberosum* leavess is evidenced by the improvement SGPT, SGOT, ALP and serum bilirubin levels. Treatment with *Chlorophytum tuberosum*

Leavess extract suppresses Isoniazid induced SGPT, SGOT, ALP and serum bilirubin elevations. Previous studies have reported elevations of transaminases after Isoniazid-Rifampicin treatment. The increase is time dependent with significant elevation noted after 48 h ($p<0.05$) suggesting severe hepatocellular damage caused by leakage of these enzymes into circulation that is normally cytoplasmic in location (Asha, *et al.*, 2004). Both the test groups i.e. low dose and high dose treated Groups shown dose dependent hepatoprotective activity. The test groups containing the plant extract alone showed an improvement in the liver activity. It clearly indicates that the plant "*Chlorophytum tuberosum* Leavess" has the hepatoprotective activity. This study showed that *Chlorophytum tuberosum* Leavess has a significant protective action against the hepatotoxicity induced by the drugs used in the treatment of tuberculosis. The hepatoprotective role of *Chlorophytum tuberosum* leavess might be due to its antioxidant potential mechanism suggesting that the extract of plant may be useful to prevent the oxidative stress induced liver damage.

CONCLUSION

Natural products are playing a vital role in health care for decades. Often different sources of natural products, plants have been a source of chemical substance, which serves as drugs in their own right or key ingredients in formulation containing synthetic drugs. The present study concluded that the ethanolic extract of *Chlorophytum tuberosum* leaves may be used as an effective hepatoprotective agent. Further studies on isolation and structural determination of active principles might be worthy. The use of synthetic medicines (allopathic) may cause severe side effects, having high cost. Hence liver complications are treating with medicinal plants having least side effects and low cost. The current research shows a detail of hepatoprotective effect *Chlorophytum tuberosum* leaves extract. Alkaloids, glycosides, terpenes, flavonoids, and saponins are found in Chlorophytum tuberosum and are used to treat a variety of liver conditions. The process of finding novel chemicals (drugs) is facilitated by the extraction of medicinal plants. Chlorophytum tuberosum is effective enough to treat liver disorders brought on by viruses and harmful substances. Leading pharmaceutical companies have helped to popularize herbal therapies for liver diseases, which have long been used in India. Even while a number of herbal remedies are very well-liked in general and for liver ailments specifically, they are still not suitable therapy options for liver diseases. Natural medicine has a long history of treating liver disorders; it began with Ayurvedic medicine and has since spread to Chinese, European, and other traditional medical systems. Numerous plants and mixtures have been reported to possess hepatoprotective properties.

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