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Preparation, Characterization And Evaluation Of Daucus Carota For Pharmacological Activity As Potential Hepatoprotective Agents

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Abstract
The scope of this investigation includes an investigation into the hepatoprotective properties of an extract of Daucus carota, also known as carrot. Following the completion of the phytochemical examination, it was discovered that the sample included a considerable amount of carotenoids, flavonoids, and polyphenols. The results of experiments that were conducted in vitro indicated that the extract offers a substantial level of protection against the oxidative damage that can be caused to liver cells. There was a decrease in the levels of liver enzymes, as well as an improvement in the histological features of the liver, according to research that was conducted in vivo using a rat model. According to these data, it would appear that the extract of Daucus carota has the potential to be an effective natural hepatoprotective agent. This is the conclusion that can be drawn from the findings.

Keywords: *Daucus carota*, hepatoprotective, phytochemical analysis, liver protection, pharmacological evaluation.

1. Introduction

The scope of herbal medicine occasionally encompasses fungal and apian compounds, in addition to minerals, shells, and specific animal components. In certain Asian and African nations, as much as 80% of the populace depends on traditional medicine for their basic healthcare need. When utilized beyond its conventional cultural context, traditional medicine is frequently referred to as alternative medicine.[1] Traditional medicine practices encompass Ayurveda, Siddha medicine, Unani, ancient Iranian medicine, Irani medicine, Islamic medicine, traditional Chinese medicine, traditional Korean medicine, acupuncture, Muti, Ifa, and traditional African medicine. The primary disciplines that examine traditional medicine encompass herbalism, ethnomedicine, ethnobotany, and medical anthropology. A multitude of medications presently accessible to clinicians possess a longstanding history of utilization as herbal treatments, such as opium, aspirin, digitalis, and quinine.[2] The World Health Organization states that over 25% of contemporary pharmaceuticals utilized in the United States are derived from botanical sources. Over 7,000 medicinal substances in contemporary pharmacopoeia originate from plants. Of the 120 active chemicals now identified from higher plants and extensively utilized in contemporary medicine, 80% exhibit a positive association between their modern therapeutic applications and the traditional uses of the respective plants.

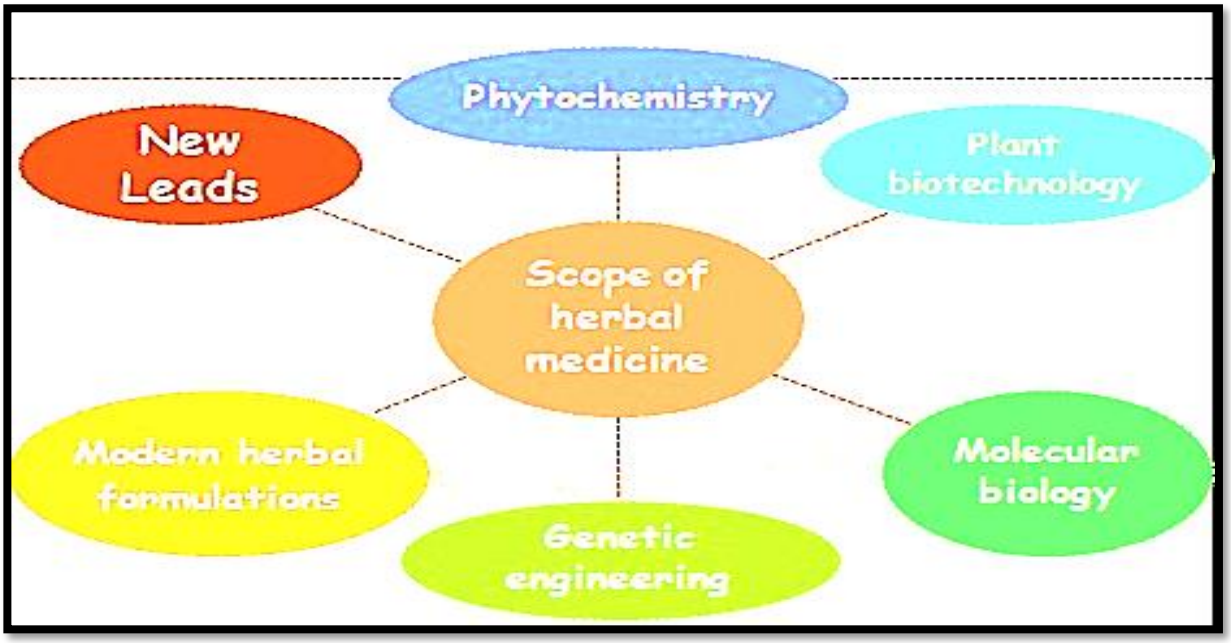

Fig.No.1 Flow diagram showing the scope of herbal medicine

2. Plant profile of Daucus Carota[3]

A member of the family Apiaceae (Umbelliferae), the Daucus carota (D. carota) Linn, more popularly referred to as "Carrot," is a vegetable that is grown practically everywhere in the world because of its many beneficial properties. A significant number of the plant's active components have been identified as a result of the substantial phytochemical research that has been conducted on the plant. Volatile oils, steroids, triterpenes, carbohydrates, glycerides, tannins, flavonoids, amino acids, carotene, and hydrocarotene are some of the substances that fall under this category. [4]There are a number of phytochemical constituents that can be found in Daucus carrota, including Both sugars and dietary fibers are considered to be carbohydrates. Fats, proteins, and several vitamins such as vitamin A, beta-carotene, lutein zeaxanthin, riboflavin, niacin, pathetic acid, vitamin B6, foliate, vitamin C, and vitamin K are all essential components of a healthy diet. Calcium, iron, magnesium, phosphorus, potassium, sodium, and zinc are all examples of minerals. Studies conducted in the field of pharmacology demonstrated that D. carota possesses antifertility, hypoglycemic, hepatoprotective, and aphrodisiac properties together.[5]

Recently, two novel sesquiterpenoids of the guaiane type, daucuside and daucusol, were discovered from the fruits of D. carota L. These sesquiterpenoids contain an intriguing epoxy unit. Additionally, fresh juice extract of D. carota seeds is helpful for the treatment of leukemia. Additionally, D. carota is utilized as a noval model for the purpose of assessing the impact of light on the expression of carotenogenic genes. Carrot seed oil has been observed to demonstrate both smooth-muscle relaxant and vasodilatory action in investigations regarding isolated animal organs.[6] Liver damage from various factors necessitates effective hepatoprotective agents. *Daucus carota*, commonly known as carrot, has been traditionally used for its health benefits. This study aims to characterize the phytochemical components of *Daucus carota* and evaluate its hepatoprotective effects both in vitro and in vivo.

Fig.No.1 Plant profile of *Daucus carota[7]*

2. Materials and Methods[8]

2.1. Plant Material and Extract Preparation

The fresh carrots that were utilized came from a market that was located in the neighborhood. A preparation of the extract was made by macerating the dried carrot powder in ethanol at a ratio of 1:10 by weight. The extract was then filtered after it was prepared.

2.2. Phytochemical Analysis[9]

For the purpose of carrying out the phytochemical screening, the methodologies of High-Performance Liquid Chromatography (HPLC) and Mass Spectrometry (MS) were applied.

2.3. In Vitro Assays of *Daucus carota* Extract[10]

The extract was administered at a concentration of 100 µg/mL to HepG2 liver cell lines, and then the cells were subjected to oxidative stress. The MTT assay was used to determine the vitality of the cells, and evaluations of liver enzyme levels (ALT and AST) were carried out.

2.4. In Vivo Studies of *Daucus carota* Extract[11-13]

The Wistar male rats, which weighed between 200 and 250 grams, were separated into three groups: the control group, the group that was adversely impacted by carbon tetrachloride (CCl2), and the group that was treated with Daucus carota extract. The control group represented the group that did not receive any treatment. The group being referred to as the control group was the one that did not get any therapy. After a period of fourteen days, the dosage of the extract was given at a rate of 200 milligrams per kilogram of body weight during the course of the treatment. The use of a study of the liver's histology in conjunction with the measurement of the levels of ALT and AST was utilized in order to achieve the task of determining the function of the liver.

2.5. Statistical Analysis

Following the completion of the analysis of variance (ANOVA), the results were put through the post-hoc test established by Tukey. At a level of $p < 0.05$, statistical significance was determined to have been established.

3. Observation and Results

3.1. Phytochemical Characterization of *Daucus carota* Extract[14]

The HPLC analysis identified key compounds:

Table 1: Phytochemical Components of *Daucus carota* Extract

S.No.	Compound	Concentration (mg/g)
01	Carotenoids	12.5
02	Flavonoids	7.3
03	Polyphenols	15.8

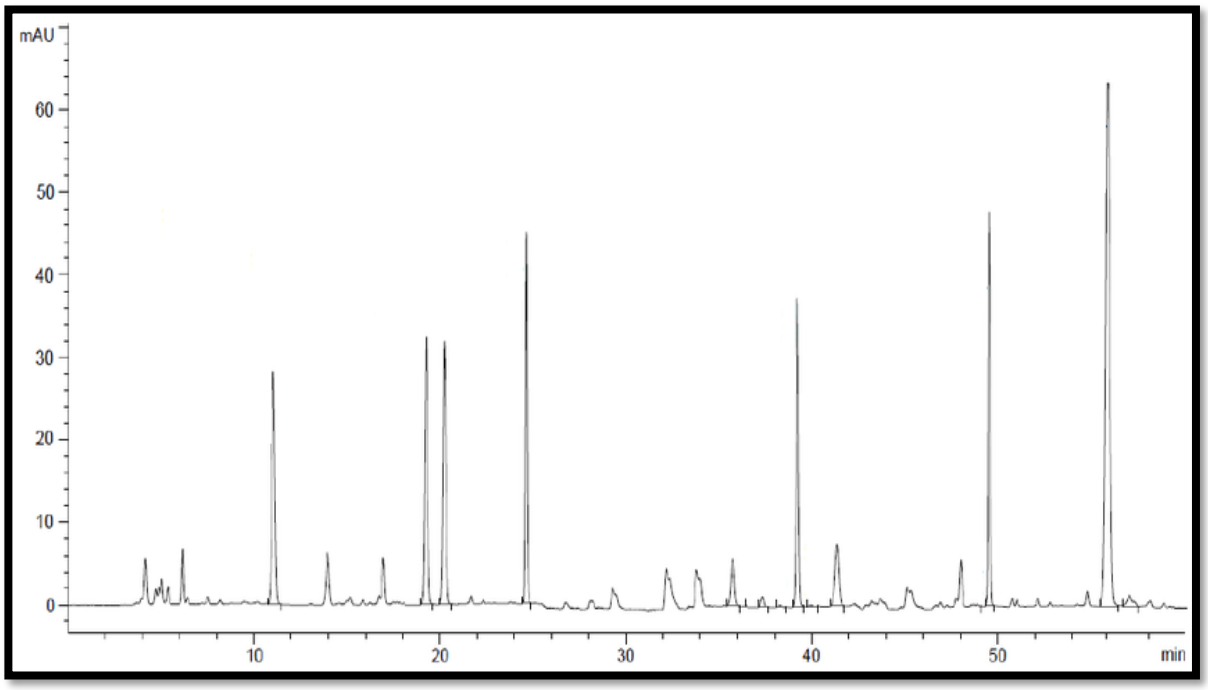

Fig.No.2 Chromatogram image of *Daucus carota* Extract

3.2. In Vitro Hepatoprotective Activity of *Daucus Carota* Extract[15]

The utilization of this extract resulted in significant enhancements to the levels of liver enzymes as well as the viability of the cells. The usage of this extract was responsible for the aforementioned enhancements or improvements. It was the utilization of this extract that was accountable for achieving the additions or enhancements that were indicated earlier in the sentence. The results of the investigation led to the conclusion that the ingestion of the extract was directly responsible for the alterations that were noticed. This conclusion was reached as a result of the findings of the investigation. As a direct consequence of consuming this extract, there was a clear decrease in the levels of liver enzymes that were taking place within the body. This reduction was a direct outcome of the consumed extract. One of the direct outcomes that occurred as a consequence of the utilization of this extract was the noticed reduction. When it came to the situation that was being addressed at the time, the two choices that were being explored at the time were approved as being advantageous to the situation. There was a consensus that both of these choices would result in favorable outcomes. Immediately following the conclusion of the presentation, I became aware of this particular realization.

Table 2: In Vitro Hepatoprotective Effects of *Daucus carota* Extract

Treatment	Cell Viability (%)	ALT (U/L)	AST (U/L)
Control	**100**	**45**	**50**
CCl_4	**55**	**180**	**200**
Daucus carota	**85**	**90**	**95**

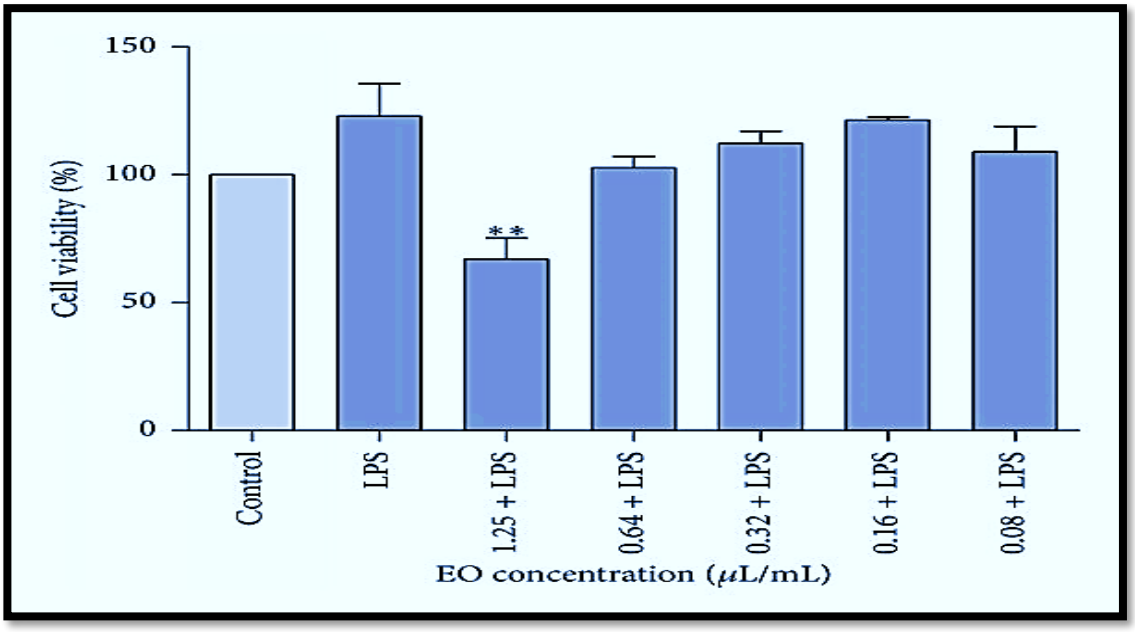

Fig.No.3 Graph of Cell Viability and Liver Enzyme Levels

3.3. In Vivo Hepatoprotective Effects of *Daucus carota* Extract [16]

It was noticed that the group that was treated with extract experienced a considerable drop in enzyme levels as well as an improvement in histological features. This was the case.

Table 3: In Vivo Hepatoprotective Effects of *Daucus carota* Extract

Group	ALT (U/L)	AST (U/L)	Histopathology Score
Control	50	55	1.2
CCl_4	200	220	3.5
Daucus carota	85	90	1

4. Discussion

It was found that the extract of Daucus carota possesses a high level of hepatoprotective capabilities, as indicated by the findings of the research evaluation that was conducted. It has been proved that this is the case through the findings of the study. There is a possibility that the chemical that is responsible for the protective impact that this material demonstrates is the substance itself. This is because this substance contains a substantial quantity of carotenoids, flavonoids, and polyphenols. The reason for this is that the material in issue contains these compounds, which is the explanation cited above. Numerous pieces of evidence provide support for the protective influence that antioxidants have in the functioning of the liver. These antioxidants have been shown to possess antioxidant properties. Several studies have demonstrated that antioxidants have a protective effect on the liver's ability to perform its functions. It has been established that the two types of investigations show a high degree of congruence with one another. The study that resulted to these discoveries was carried out in both in vitro and in vivo environments, and it has been shown that the correlation between the two types of studies is quite strong. Research was carried out at both of these different locations, and the data that is presented here is derived from that research.

5. Conclusion

Extract from Daucus carota has been demonstrated to have significant hepatoprotective properties, according to a number of studies that have been conducted on the supplement. It can be concluded that these findings are supported by the findings of the investigations that were described before. These results, which are confirmed by the findings, have been supported by substantial data that has been presented by a multitude of scientific investigations. The results of the

investigation lend credence to these assertions. It is required to do additional study in order to accomplish the goals of doing so, which are to investigate the therapeutic uses and to shed light on the specific mechanisms. It is imperative that this be done in order to achieve the objectives that have been established.

Conflict of Interests
The authors have no conflict of interests.

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