Medicinal Plants with Anti-Poisoning Toxicity of Carbon Tetrachloride: An Overview of the Most Important Medicinal Plants Native to Iran with Anti-Carbon Tetrachloride Toxicity

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Abstract: One type of the liver poisoning is poisoning with carbon tetrachloride. Carbon tetrachloride-induced liver damage is related to the toxic agent which is metabolized by the NADPH-cytochrome P450 enzyme system to reactive radicals including trikler and methyl-o-proxyler. One of the available remedies to protect liver is the use of medicinal plants. Since in Iran liver protective drugs are less available, then the use of available natural remedies that have fewer toxic side effects than chemical drugs seems necessary. In the present study, medicinal plants native to Iran have been reviewed and reported which have liver protective effect against toxicity induced by carbon tetrachloride as a factor causing human poisoning. In this review study, literatures were searched with key words including liver toxicity, carbon tetrachloride, herbs, extracts, and essential oils. The papers were searched from databases inside and outside Iran including Google Scholar, SID, MegaIran databases, and a number of other databases. Based on the results, medicinal herbs such as grape, oak, Aucheri, pistachio, Fumaria, and milk thistle are anti-poisoning plants against carbon tetrachloride. Since the active ingredients of the mentioned plants have been specified in the phytochemical studies, then catechin, epi catechins, epi-3-gallate catechin, mucilage, calheritrin, fumaric acid and an alkaloid called fumarinkoerist, and nitrose amine are probably the active ingredients against carbon tetrachloride poisoning.

Keywords: liver, Poisoning, Carbon tetrachloride, Herbs, Iran

Introduction

The liver is an organ of the body which plays an important role in the metabolism of compounds, detoxification and excretion of toxins and drugs from the body. Liver dysfunction and failure is a major public health issue [1,2]. Liver exposes to all kinds of threats and microbial and chemical infectious and these factors cause toxicity in the liver [3-5]. Many substances may cause liver toxicity and medicinal plants with antioxidant activity have shown to reduce this toxicity [6-9]. One type of the liver poisoning is poisoning with carbon tetrachloride. Carbon tetrachloride-induced liver damage is related to toxic agents which are metabolized by NADPH-cytochrome P 450 enzyme system to trickler, methyl-o-trickler, and methyl [10]. Such radical attack unsaturated fatty acids and add alkyl to the protein groups and other macromolecules and lead to membrane lipid peroxidation, changes in enzyme activity, and ultimately cell damage and necrosis [11]. Increasing prevalence of the disease has caused scientists to find solution diseases. Various factors have been proposed to treat and reduce symptoms of liver toxicity. One of the available remedies for liver protection is the use of medicinal plants.
Since the liver protection drugs are less accessible in our country and then the use of available natural remedies that have fewer toxic side effects than chemical drugs seems necessary. These plants are frequently used for various diseases [11-16]. Medicinal plants are a rich source of bioactive and pharmacological compounds [17-22]. Most of these plants have antioxidant activity [23]. In the present study medicinal plants native to Iran, which have protective effects against liver toxicity induced by carbon tetrachloride as a factor causing human poisoning have been reviewed and reported.

Methods

In this review study, the literatures were searched with key words such as liver toxicity, carbon tetrachloride, herbs, extracts and essential oils. Articles were obtained from databases inside and outside Iran like Google Scholar, SDI, Mag Iran, and a number of other databases.

Results and Discussion

There are six plants in Iran which are used as protecting against the liver against carbon tetrachloride. Medicinal plants including grape, oak, Aucheri, nuts, pistachio, fumaria, and milk thistle are the most important drug against the toxicity of carbon tetrachloride. The mentioned herbal medicines are represented in Table 1 with additional information.

Table1: Liver protective medicinal native to Iran against carbon tetrachloride with Persian name, scientific name, family name

<table>
<thead>
<tr>
<th>Row</th>
<th>Scientific Name</th>
<th>Family Name</th>
<th>Persian name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grape</td>
<td></td>
<td>Grape</td>
<td>Grape seed extract (100 mg) with Oak (100 mg) for 7 days by gavage in male Wistar rats decreased activity of the enzymes including alkaline phosphatase, aspartate aminotransferase, alanine aminotransferase and bilirubin compared to the control group [24].</td>
</tr>
<tr>
<td>2</td>
<td>Quercus species</td>
<td>Oak</td>
<td></td>
<td>Intraperitoneal injection of carbon tetrachloride increases the enzymes including AST, ALT and ALP in male Wistar rats that were orally treated with 400 and 500 mg aucheri reduced the mentioned enzymes [25].</td>
</tr>
<tr>
<td>3</td>
<td>Doremaauchri</td>
<td>Aucheri</td>
<td></td>
<td>Administration of pistachio gum extract in doses of 0.5 and 1 g/kg in male Wistar rats before carbon tetrachloride, significantly prevents increasing pyruvate glutamyl transaminase (SGPT) level [26].</td>
</tr>
<tr>
<td>4</td>
<td>Pistacia vera L</td>
<td>Pistachio</td>
<td></td>
<td>The experimental study on the protective effect of extracts of fumaria with a dose of 700 micrograms to 3.5 micrograms per mL has protective effect on the liver cells 20 minutes before adding the carbon tetrachloride [27].</td>
</tr>
<tr>
<td>5</td>
<td>Fumariacea</td>
<td>Fumariaparviflora L.</td>
<td>Fumaria</td>
<td>Silymarin administration at a dose of 50 milligrams per kilogram 6 hours after injection of carbon tetrachloride significantly prevents the progress of hepatotoxicity [28].</td>
</tr>
</tbody>
</table>
| 6   | Silybummarianum L. | Milk thistle |             | Based on the results of this study, it was found that medicinal plants including grape, oak, Aucheri, pistachio, Fumaria, and milk thistle are the most important anti-toxicity of carbon tetrachloride.

Catechins, epi-catechins, and epi-3-gallate catechin are compounds in grape seed [29, 30]. Aucheri is a plant that is rich in flavonoids (Wollenweber et al., 1995). Different members of fumaria is rich with materials such as resin compounds, various minerals, mucilage, calhertrin, crystalline organic acid alkaloid called Fumaric acid and alkaloid called fumarine [31,32]. This plant is blood purifier, food digestive, appetizer, opener of liver obstruction, and is also an effective drug in the treatment of jaundice, spleen, liver complications [33,34]. The outer shell of pistachios has been used in ancient times to prevent rotting teeth, teeth and gums.
strength, and mouth freshener and also epi-karpaera boiled extract is useful for wound healing in the mouth and beneficial for vomiting and diarrhea [35]. Among the compounds of oak quercit, nitrozan, and amidan can be named [20]. Given that the effects of medicinal plants including grape, oak, aucheri, pistachio, fumaria, and milk thistle have been shown in experimental studies and since the active ingredients of the mentioned plants have been specified in the phytochemical studies, then catechins, epicatechins, epi-3-gallate catechin, mucilage, calthertherin, fumaric acid, and an alkaloid called fumarin- quercit, nitosan, and amidan are probably active ingredients against carbon tetrachloride poisoning. The exact mechanism actions of these plants remain to be clear.

CCl4 induces severe oxidative stress, increases hepatocytes and inflammatory responses. So that in an experiment following the usage of CL4 the levels of malondialdehyde (MDA), glutamate oxalate transaminase (GOT), glutamate pyruvate transaminase (GPT) increased and the levels of catalase (CAT), glutathione (GSH), superoxide dismutase (SOD), glutathione peroxidase (GPx) as well as total antioxidant capacity decreased (Rui et al., 2014). Antioxidants in a wide variety of experiments have been shown to decrease the levels of GPT, GOT, MDA, TLR4 and CYP2E1, and increase SOD, GPx, CAT, GSH, and counteract the gene expressions of NF-κB/cREL and inflammatory cytokines such as TNF-α [36-42]. Therefore, other plants with antioxidant activities [43-55] might decrease the complications of CCl4 induced toxicity.

Conclusion

The plants presented in table 1 have antioxidant activity. Hence, they may induce their effects, at least in part, by their antioxidant activities.

References


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