RESEARCH OF THE HEPATOPROTECTIVE ACTIVITY OF SWEET WOODRUFF DRY EXTRACT

N.S.Iurchenko, T.V.Ilyina, A.M.Kovalyova, A.O.Klymenko*, V.M.Ivanochko*

National University of Pharmacy
Ivano-Frankivsk National Medical University*

Key words: sweet woodruff; hepatoprotective activity; dry extract

Sweet woodruff (Asperula odorata L.) of Rubiaceae Juss. family is not officinal plant, which is used in folk medicine as a sedative, diuretic and choleretic agent. The hepatoprotective activity of a dry extract of sweet woodruff herb has been determined experimentally on the model of the acute toxic liver damage in rats. It has been found that the extract of sweet woodruff in the dose of 25 mg/kg reduces the intensity of lipid peroxidation, normalizes biochemical indicators of the animal blood and the liver homogenate to the level of intact animals, decreases toxic effects of tetrachlormethane. Moreover, the activity of ALT and AST in the blood serum decreases by 2.2 and 2.1 times, respectively; the cholinesterase activity increases by 13%, the level of TBA-reagents in the blood serum and the liver tissue decreases by 1.3 and 1.6 times, respectively, compared to the control group of animals. To confirm the results of the research the study of the histological structure of the liver of the experimental animals has been carried out. While studying the histology of the liver in treated animals the degenerative changes and the phenomenon of structural degradation and signs of severe hemodynamic disorders have not been detected. By its hepatoprotective action the sweet woodruff extract is practically not inferior to the reference drug Silibor.

The aim of this work was to study the hepatoprotective activity of the dry extract of sweet woodruff herb on the model of the acute tetrachlormethane-induced hepatitis.

Materials and Methods

The object of our study was the air-dried herb of sweet woodruff (Asperula odorata L.) harvested at the flowering stage in the summer of 2012 in the Kharkiv region. The dry extract was obtained by 3-fold extraction of the raw material with 70% ethanol at the ratio of 1:3. The liquid extracts were evaporated under vacuum in order to remove the extractant and obtain a dry residue. The yield was 7.6%. The main active substances of the extract were hydroxycinnamic acids and flavonoids. Their content was determined by the spectrophotometric method and was 7.57% of hydroxycinnamic acids (equivalent to chlorogenic acid) and 3.69% of flavonoids (equivalent to rutin).

The research of the hepatoprotective activity was carried out on the model of the acute tetrachlormethane-induced hepatitis in white male rats weighing 0.18-0.25 kg. They were divided into 4 groups of 6 animals each: the first group – animals that were injected subcutaneously with the sweet woodruff extract in the dose of 25 mg/kg, the second group – animals treated with the reference drug Silibor in the dose of 25 mg/kg, the third group – the control group consisting of untreated animals and the fourth group – the intact animals. The liver disease was modeled by a single subcutaneous injection of 50% oil solution of tetrachlormethane in the dose of 0.8 ml per 0.1 kg of the animal to the first three groups for 2 days with the interval of 24 hours. The dry extract studied and the reference drug were injected subcutaneously to the animals of the first and second groups for 1 hour before and in 2 hours after the hepatotropic poisoning [1, 5].

Rats were decapitated on the third day after the first injection of tetrachlormethane. The conclusion of the pharmacotherapeutic efficiency of the extracts studied was based on the biochemical and...
The effect of the sweet woodruff dry extract on the biochemical indices of the blood and the state of the liver in acute hepatitis

<table>
<thead>
<tr>
<th>Biochemical and hematological indices</th>
<th>Objects of the research</th>
<th>Intact animals</th>
<th>50% oil solution of CCl₄</th>
<th>Silibor</th>
<th>Sweet woodruff dry extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood serum</td>
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<tr>
<td>ALT, mcmol/h.ml</td>
<td>0.61 ± 0.015*</td>
<td>0.27 ± 0.008*</td>
<td>1.36 ± 0.04*</td>
<td>0.24 ± 0.015*</td>
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<tr>
<td>AST, mcmol/h.ml</td>
<td>0.52 ± 0.014*</td>
<td>0.23 ± 0.008*</td>
<td>1.08 ± 0.04*</td>
<td>0.20 ± 0.015*</td>
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<tr>
<td>CE, µkat/L</td>
<td>66.5 ± 0.76*</td>
<td>72.3 ± 1.45*</td>
<td>57.8 ± 1.54*</td>
<td>84.5 ± 1.89</td>
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<tr>
<td>ALP, µkat/L</td>
<td>1.97 ± 0.13*</td>
<td>1.85 ± 0.07*</td>
<td>2.08 ± 0.13*</td>
<td>1.60 ± 0.08</td>
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<tr>
<td>TBA-reagents, nmol/ml</td>
<td>4.53 ± 0.04*</td>
<td>3.86 ± 0.05*</td>
<td>5.84 ± 0.02*</td>
<td>3.52 ± 0.07</td>
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<tr>
<td>Liver tissue homogenate</td>
<td></td>
<td></td>
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<tr>
<td>TBA-reagents, mkmol/g</td>
<td>38.2 ± 0.76*</td>
<td>33.5 ± 0.87*</td>
<td>62.2 ± 1.51*</td>
<td>26.2 ± 0.63</td>
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Note: * – Reliability of deviation comparing to the control group of animals (p ≤ 0.05).

The research results (Table) indicate that the toxic effects of tetrachloromethane on the liver of untreated animals was characterized with development of cytosis of hepatocytes as evidenced by a significant increase in the enzyme activity of ALT and AST by 5.7 and 5.4 times, respectively, compared to the indices of intact animals.

At the same time increase of the TBA-reagents content in both the serum and the liver tissue homogenate in animals by 1.65 and 2.37 times, respectively, compared to those of intact animals was observed. The level of the cholinesterase activity in the blood serum of animals in the control group decreased by 31.6%, the level of the alkaline phosphatase activity increased by 30.0% compared to the group of intact animals. The results obtained indicate the presence of the oxidative stress in animals.

Introduction of the sweet woodruff dry extract had positive effects on the liver and improved the blood biochemical indices: the activity of ALT and AST in the serum decreased by 2.2 and 2.1 times, respectively; the cholinesterase activity increased by 13%, the level of TBA-reagents in the blood serum and the liver tissue decreased by 1.3 and 1.6 times, respectively, compared to the control group of animals.

To confirm the results of the study, the research of histological structure of the liver of experimental animals has been carried out.

While studying the histology of the liver in treated animals the degenerative changes and the phenomenon of structural degradation and signs of severe hemody-
The results of the morphological studies of the internal organs of animals are presented in Fig. 1.

While studying the histological preparations of the first group of animals (Fig. 1a) it was found that the microscopic lobular structure of the liver was preserved. At the periphery of the particles along the portal tracts there were individual hepatocytes with full-blown vacuolar degeneration and preserved nucleus. The parenchyma hepatocytes were normal, somewhere increased in size, their nuclei had a clear contour with a distinct nucleolus. The central veins were plethoric. Sinusoidal capillaries were irregularly plethoric. The ducts were expanded. The wall of the bile duct was represented by a single layer cubic and the cylindrical epithelium. There were focal accumulations of mononuclear cells in the stroma of portal tracts and around large vessels in the perisinusoidal spaces (Fig. 1b).

The results of pathomorphological studies of the liver of the experimental animals indicate that changes in the internal organs are comparable with intact animals.

CONCLUSIONS

The sweet woodruff dry extract in the dose of 25 mg/kg on the model of the tetrachlormethane-induced acute toxic liver damage in rats has shown the hepatoprotective effect normalizing biochemical indicators of the animal blood and the liver homogenate to the level of intact animals. This extract reduces the intensity of lipid peroxidation and decreases toxic effects of tetrachloromethane providing the hepatoprotective effect.

By its hepatoprotective action the sweet woodruff extract is practically not inferior to the reference drug Silibor.

REFERENCES

ИССЛЕДОВАНИЕ ГЕПАТОПРОТЕКТОРНОЙ АКТИВНОСТИ СУХОГО ЭКСТРАКТА ТРАВЫ ЯСМЕННИКА ДУШИСТОГО
Н.С.Юрченко, Т.В.Ильина, А.М.Ковалева, А.О.Клименко*, В.М.Иванючko*
Національний фармацевтичний університет, Івано-Франківський національний медичний університет*

Ключевые слова: ясменник душистый; гепатопротекторная активность; сухой экстракт

Ясменник душистый Asperula odorata L. семейства мареновые Rubiaceae Juss. – неофициальное растение, которое в народной медицине используется как седативное, мочегонное, желчегонное средство. Экспериментально на модели острого токсического поражения тетрахлоретаном печени крыс установлено гепатопротекторную активность сухого экстракта травы ясменника душистого. Выявлено, что экстракт ясменника душистого в дозе 25 мг/кг снижает интенсивность процесса перекисного окисления липидов у животных, доводит биохимические показатели крови и гомогената печени до уровня интактных животных, снижая токсическое действие тетрахлоретана. При этом активность АЛАТ и АСАТ в сыворотке крови снижается в 2,2 и 2,1 раза соответственно; активность холинэстеразы возрастает на 13%; уровень ТБК-реактантов в сыворотке крови и ткани печени снижается в 1,3 и 1,6 раза соответственно по сравнению с контрольной группой животных.

Для подтверждения результатов проведено изучение гистологического строения печени исследуемых животных. При исследовании гистологической картины печени у леченных животных исследуемой группы деструктивные изменения и явления деструкции структурной организации элементов органа, признаков выраженных расстройств гемодинамики не были выявлены. По степени гепатопротекторного действия экстракт ясменника душистого практически не уступает препарату сравнения «Силибору».

Address for correspondence:
53, Pushkinska str., Kharkiv, 61002, Ukraine.
Tel. (572) 67-92-08. E-mail: n-yurchenko88@ukr.net.
National University of Pharmacy

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