The study of the effect of new herbal medicinal products on the functional state of the gastrointestinal tract

A high prevalence of hepatobiliary system disorders among the population was the key factor for development of combined herbal medicinal products with the hepatoprotective action, namely Hepafisan capsules, Phytovenol capsules, Polyherbagastrin granules and Hepatropin granules. The composition of new medicinal products includes plants that positively affect digestive processes (milkthistle fruit, milk-govan root; common fumitory grass, horse chestnut seed, common licorice root, corn silk from styles, wheat middlings, and common oat fruit), they are also used in hepatitis and cholecystitis.

Aim. To study the possible effect of Hepafisan capsules, Phytovenol capsules, Polyherbagastrin granules and Hepatropin granules on the GIT motor activity and the gastric secretory function.

Materials and methods. The study of the effect on the GIT peristalsis (gastric evacuation function and intestinal motor activity) was performed using the method of Sticknay J. S. et al. on male mice, and the study of the effect on the gastric juice secretion was performed by the method of Andrieieva, N. I. and Sharova, S. D. on male rats.

Results. The results obtained showed that introduction of the medicinal products studied did not increase the intestinal peristalsis and had no effect on the gastric secretory function and acidity of the gastric juice.

Conclusions. Introduction of Hepafisan capsules, Phytovenol capsules, Polyherbagastrin granules, Hepatropin granules to animals has no effect on the GIT motor activity and does not change the gastric secretory function and acidity of the gastric juice in animals.

Key words: liver diseases; hepatoprotectors; herbal medicinal products; gastro-intestinal tract

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Дослідження впливу нових рослинних лікарських засобів на функціональний стан шлунково-кишкового тракту

Значна поширеність серед населення захворювань гепатобіліарної системи стала передумовою для розробки комбінованих фітозасобів гепатопротекторного дії – капсул «Гепафісан», «Фітовенол», гранул «Полігербагастрин», «Гепатропін». До складу нових засобів входять рослини, що позитивно впливають на процеси травлення (плоди розторопші, коріння кульбаби лікарської, трава рутки лікарської, насіння гіркокаштану звичайного, коріння солодки галої, стовпчики з приймочками кукурудзи, висівки пшеничні, плоди вівса посівного), їх також застосовують при гепатиті і холецисті.

Мета – вивчення можливого впливу капсул «Гепафісан», «Фітовенол», гранул «Полігербагастрин», «Гепатропін» на рухову активність ШКТ та секреторну функцію шлунка.

Матеріали та методи. Вивчення впливу на перистальтику ШКТ (евакуаторну функцію шлунка та моторну активність кишечника) проведено за методом Sticknay J. S. із співавт. на мишах самців, а вивчення впливу на секрецію шлункового соку – за методом Андрєєвої Н. І. і Шарової С. Д. на щурах самців.

Результати. Згідно з отриманими результатами введення досліджуваних засобів не підвищувало перистальтику кишечника, не впливало на секреторну функцію шлунка та кислотність шлункового соку.

Висновки. Введення тваринам капсул «Гепафісан», «Фітовенол», гранул «Полігербагастрин» і «Гепатропін» не впливає на рухову активність ШКТ та не змінює секреторну функцію шлунка та кислотність шлункового соку у тварин.

Ключові слова: захворювання печінки; гепатопротектори; рослинні засоби; шлунково-кишковий тракт

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C hronic diseases of the gastrointestinal tract occupy one of the leading places in pathology both in adults and children. Despite the success achieved in the field of diagnosis of digestive diseases 15-20 % of the adult population suffers from acute and chronic liver pathologies. Among liver diseases, viral hepatitis ranks first by its prevalence, and toxic damage of the liver ranks second. In recent years, the increase in morbidity of the population has been associated with the unfavorable ecological situation, unhealthy diet, as well as toxic and allergic damages of digestive organs. The impaired function of the hepatobiliary system (HBS) may develop under exposure to factors of the infectious nature, toxic substances of the exogenous and endogenous origin, radiation, hypoxia, as well as in disorders of systemic and peripheral hemodynamics [1, 2].

Currently, for pharmacotherapy and prevention of diseases of the HBS different groups of drugs are used: antioxidants, chologogues, vitamin products, steroidal and non-steroidal anabolic agents, immunomodulators, anti-inflammatory agents of steroidal and non-steroidal nature, detoxication agents, enzyme system-inducing agents, food substitutes, metabolism-improving agents, etc. However, among these drugs a relatively small group of medicinal products possessing a selective effect on the liver is distinguished; these are hepatotrophic drugs. Their action is focused on restoring the liver homeostasis, enhancing the organ resistance to exposure to exogenous toxins, normalizing liver functions and stimulating reparative processes in the liver [3-5].

When treating chronic diseases of the HBS a significant role is played by phytogenic drugs that have the complex anti-inflammatory, choleretic, demineralizing, antisepsic, antispasmodic, capillary-strengthening and antibacterial action, enhance the detoxification function of the liver and normalize the gallbladder tone. The effects mentioned develop due to the presence of different classes of biologically active substances (BAS), such as polyphenols, flavonoids, saponins, lectins, polysaccharides, ecydysteroids, multivitamins, etc., in the composition of herbal medicinal products [6-10].

A high prevalence of hepatobiliary system disorders among the population was the key factor for development of combined herbal medicinal products with the hepatoprotective action, namely Hepafisan capsules, Phytovenol capsules, Polyherbagastrin granules and Hepatropin granules. These products have the following composition:
- Hepafisan capsules contain the native powder of the following medicinal plants (per one capsule): milkthistle seeds – 0.075 g; milk-govan root 0.06 g; peppermint leaf – 0.045 g; bean trefoil grass – 0.015 g; pot marigold flower – 0.03 g; common agrimony grass – 0.045 g; common fumitory grass – 0.03 g.
- a single-dose pouch of Polyherbagastrin granules contains the native powder of sandy everlasting blossom – 0.1 g; corn silk from styles – 0.1 g; horsetail grass – 0.1 g; knot grass – 0.1 g; horse chestnut seed – 0.02 g; licorice root – 0.08 g; horse chestnut seed – 0.02 g; licorice root – 0.08 g; wheat middlings – 3.0 g.
- a single-dose pouch of Hepatropin granules contains the native powder of pot marigold flower – 0.1 g; licorice root – 0.1 g; valerian root and rootstalk – 0.1; camomile flower – 0.04 g; horse chestnut seed – 0.02 g; nettle leaf – 0.1 g; rose hips – 0.04 g; wheat middlings – 3.0 g.
- Phytovenol capsules contain the native powder of the following medicinal plants (per one capsule): horse chestnut seed – 0.09 g; Virginian hamamelis leaf – 0.075 g; common oat grains – 0.03 r; Sophora japon tea fruit – 0.03 g; European goldenrod grass – 0.03 g; meadowsweet grass – 0.03 g; common melilot grass – 0.015 g.

The new medicinal products studied contain plants in the form of the native raw material, which have an effect on digestive processes: milkthistle fruit; milk-govan root; common fumitory grass; horse chestnut seed; common licorice root; corn silk from styles; wheat middlings; common oat fruit. The above-mentioned effect may be a valuable therapeutic property for treating digestive diseases, including hepatitis and cholecystitis [6-9].

Taking into account the composition and the oral route of administration of new medicinal products, namely Hepafisan capsules, Polyherbagastrin gra-
nules, Hepatropin granules, and Phytovenol capsules, the aim of our work was to study the possible effects of the products on the GIT motor activity and the gastric secretory function.

Materials and Methods

The study of the effect of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules on the GIT peristalsis (gastric evacuation function and intestinal motor activity) was performed using the method of Sticknay J. S. et al. [12]. The study was conducted on male white outbred mice with the body weight of 20-22 g. Animals were kept on starvation diet for 24 hours with unrestricted access to water. Since the herbal medicinal products studied were intended for oral use, they were introduced to mice intragastrically in a single dose. Doses for mice were calculated using the coefficient of species sensitivity by Rybolovlev, Yu. R. [13] on the basis of the conventional therapeutic doses determined when studying the pharmacological activity in rats [14].

One hour after introduction of the products studied animals were intragastrically given 0.3 mL of the contract mass (10% suspension of activated carbon in 1 % starch paste). In 40 min, animals were withdrawn from the experiment by dislocation of cervical vertebrae. The absolute length of the intestine (Li) and the distance passed by the contrast mass along the intestine (Ltc) were measured in centimeters. As an integral indicator characterizing the strength of the GIT peristalsis the percentage of the total intestinal length passed by the contrast mass was used: Ltc / Li • 100 %.

The study of the effect of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules on the gastric juice secretion was performed by the method of Andrieieva, N. I. and Sharova, S. D. [15]. The study was conducted on male white outbred rats with the body weight of 190±10 g. According to the experiment conditions animals were kept on starvation diet for 48 hours with unrestricted access to water. Afterwards, a single intragastric introduction of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules was performed in the conventional therapeutic doses determined when studying the pharmacological activity. The equivalent amount of water was given to animals from the negative control group. One hour after intragastric introduction of the products studied animals of the experimental groups and control group were anesthetized by intraperitoneal introduction of 1 % barbamyl solution in the dose of 8 mL per 100 g of the body weight [15]. Then the abdominal cavity of animals was opened, and the ligature was applied on the gastric pyloric sphincter. In 4 hours ligature was applied on the gastric cardiac sphincter. Subsequently, animals were decapitated, the gastric juice was collected.

Table 1

| Experiment conditions | Dose, mg/kg | % of the intestinal length |
|-----------------------|------------|---------------------------|
| Positive control      | -          | 65.66 (62.75÷69.10)       |
| Hepafisan capsules    | 70         | 67.57 (61.43÷69.42)       |
| Polyherbagastrin granules | 800   | 65.74 (61.50÷72.58)       |
| Hepatropin granules   | 800        | 68.28 (42.85÷72.73)       |
| Phytovenol capsules   | 133        | 64.95 (59.32÷68.67)       |

Note. n – the number of animals in the group.

Table 2

The effect of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules on the gastric secretory function of white rats X±Sx, n=8

| Experiment conditions | Dose, mg/kg | The volume of the gastric juice, mL / 100 g of the animal's body weight | The total acidity, V in mL of 0.1 N NaOH per 100 mL of the gastric juice | Free acidity, V in mL of 0.1 N NaOH per 100 mL of the gastric juice | Bound acidity, mL |
|-----------------------|------------|-----------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------|------------------|
| Control               | 1.25±0.01  | 61.68± 4.52                                                   | 35.61± 4.36                                                        | 26.07±5.90                                                      |
| Hepafisan capsules    | 81         | 1.18±0.10                                                   | 64.51± 6.89                                                        | 39.84± 6.68                                                      | 24.67±3.40       |
| Polyherbagastrin granules | 900 | 1.27±0.01                                                   | 63.96±5.53                                                        | 39.94±2.42                                                      | 27.02±4.13       |
| Hepatropin granules   | 900        | 1.16±0.10                                                   | 65.96± 8.01                                                        | 37.73± 6.20                                                      | 28.23±3.38       |
| Phytovenol capsules   | 150        | 1.26±0.07                                                   | 65.19±3.16                                                        | 37.33± 4.93                                                      | 27.85±3.50       |

Note. n – the number of animals in the group.
lected, and its volume was measured. The intensity of the gastric juice secretion was calculated per 100 g of the body weight. Acidity of the gastric juice was determined by amount of 0.1N NaOH solution in mL used for titration of 100 mL of the gastric juice. Titration was performed in the presence of two indicators (phenolphthalein and dimethylaminoazobenzene), it allowed determining both free HCl and bound HCl in one sample, and then the total acidity was calculated [16].

Results and Discussion

The results of this study (Tab. 1) demonstrated that a single introduction of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules in the conventional therapeutic doses has no effect on the motor-evacuation function of the GIT, i.e. does not enhance the intestinal peristalsis.

Analysis of the research results presented in Tab. 2 suggests that against the background of the introduction of Hepafisan capsules, Polyherbagastrin granules, Hepatropin granules, and Phytovenol capsules in the conventional therapeutic doses to rats there were no changes of the gastric juice secretion and acidity.

CONCLUSIONS

A single introduction of Hepafisan capsules, Phytovenol capsules, Polyherbagastrin granules and Hepatropin granules has no effect on the GIT motor activity and does not change the gastric secretion function and acidity of the gastric juice.

Conflicts of Interest: authors have no conflict of interest to declare.

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