Pharmacological studies of the phytogel “Imbirol”

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Abstract
With technological, structural, mechanical, physical and chemical properties of the gel was developed a gel base that meets modern foundations local action. A further task was to support the optimal concentration of active material - essential oils.

Keywords: gel, essential oils, upper respiratory tract infection, microbiological activity and acute toxicity.

1. Introduction
An important task of the modern pharmacy is to provide population with effective medications, including the treatment and prevention of infectious and inflammatory diseases of the upper respiratory tract. It is proved that the nature of soft core has an active influence on release of active materials. Due to this a well distributed and absorbed into mucous gel was chosen as a form of release which leads to higher bioavailability of active materials [1]. On the basis of literature and microbiological research the following essential oils were selected as active ingredients: ginger, clary, marjoram and tea tree [2, 3]. The essential oil of ginger (Olei Zingiber officinale) has a wide range of actions, including: anti-inflammatory, warming, antiseptic. As essential oils have also pathogenic activity, it helps to lower high temperature. The essential oil of marjoram (Olei Majarana hortensis L.) has antibacterial, antifungal and antiseptic properties. It is very good for rhinitis, inflammation of the sinuses and others. The essential oil of Salvia (Olei Salvia sclarea L.) is a strong analgesic, has a strong bactericidal anti-virus and anti-inflammatory action [4, 5]. Tea tree essential oil (Olei Melaleuca alternifolia L.) is a powerful antiseptic, has a strong anti-viral and anti-inflammatory action. Also it provides wound-healing effect [6-10]. The purpose of this study was to support the optimal concentrations of selected essential oils in gels and learning of general toxical properties of the product.

2. Materials and methods
For screening of antibacterial action 5 gel samples were prepared with different concentration of essential oil. Gel sample number 1 - gel base + 1% essential oils of ginger, 1% of clary, 0.5% of marjoram. The gel sample number 2 - gel base + 1% essential oils of clary, 0.5% of tea tree, 0.5% of marjoram. Gel sample number 3 - gel base +1% essential oils of ginger, 1% of clary, 0.5% of tea tree. Gel sample number 4 - gel base +1% essential oils of ginger, 0.5% of tea tree oil, 0.5% of marjoram. Gel sample number 5 - gel base + 1% essential oils of ginger, 1% of clary, 0.5% of tea tree oil, 0.5% of marjoram. Gel sample number 6 - gel base + 1% essential oils of ginger, 1% of clary, 1% of marjoram, 1% of tea tree. Antimicrobial activity test specimens studied in vitro using agar diffusion method ("wells"). This method is based on the ability of active materials to diffuse in agar medium, which is pre-sown microorganisms. According to the WHO test strains of Staphylococcus aureus were used to assess the activity of medications, Escherichia coli, Basillus subtilis, Candida albicans. Microbial load was 107 microbial cells per 1 ml of substance and established according to the standard McFarland. The 18-24 hour cells of microorganisms were taken into research. Determination of antibacterial medications carried out on two layers of dense nutrient medium, water, salt). The bottom layer is the 10 mm substrate which horizontally set 3-6 thin-walled stainless steel cylinder with a 8 mm diameter and 10 height. The top layer consisting of a nutrient agar medium, melted and cooled to 40 °C where appropriate standard daily culture test microbe is poured around cylinders. Previously, the top layer is well mixed to form homogenous mass After freezing cylinders were removed and placed in a hole formed in the test substance on the basis of its volume (0.3 mL). The amount of medium for the upper layer ranged from 14 to 16 ml. Cups were dried for 30-40 minutes at room temperature and placed
Thus, the results of conducted research show the toxicity classification of substances as non-toxic (5001 < LD₅₀ < 15000 mg/kg) for oral administration to rats. According to the classification “Imbyrol” LD₅₀ value, which was 8100 (7390 ÷ 8800) mg/kg after oral administration. In the slightest dose of the selected range, we find in table the dose range 7500 ÷ 9400 mg/kg. According to the method of evaluating the temoporfin-loaded liposomal gels for topical delivery system. Drug. Dev. Ind. Pharm 2013; 39 (11):1750-1757.

3. Results and discussion

Six phytogel samples were studied with the complex of essential oils. To obtain bases was selected “Ultrez-10 NF” gelling carboxymethyl cellulose (CMC) by company “Lubrizol”, and it was neutralized with triethanolamine in the ratio 1:1. The complex of essential oils previously dissolved in PEG-40 hydrogenated castor oil (PEG – 40 HCO) with 96% ethanol, and then administered into a gel base.

The results of screening of antibacterial phytogel samples action are presented in Table 1.

<table>
<thead>
<tr>
<th>Sample number</th>
<th>Microorganisms cultures</th>
<th>Zone diameters of microorganisms stunted growth, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. aureus</td>
<td>E. coli</td>
</tr>
<tr>
<td>1</td>
<td>14,5±0,3</td>
<td>13,5±0,2</td>
</tr>
<tr>
<td>2</td>
<td>14,5±0,2</td>
<td>14,2±0,3</td>
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<td>3</td>
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<td>5</td>
<td>16,5±0,4</td>
<td>15,5±0,5</td>
</tr>
<tr>
<td>6</td>
<td>17,5±0,5</td>
<td>14,8±0,3</td>
</tr>
</tbody>
</table>

These data indicate that the LD₅₀ value for “Imbyrol” gel is in the dose range 7500 ÷ 9400 mg/kg. According to the method in the slightest dose of the selected range we find in Table LD₅₀ value, which was 8100 (7390 ÷ 8800) mg/kg after oral administration. According to the classification “Imbyrol” phytogel for oral administration to rats is classified practically as non-toxic substances (5001 < LD₅₀ < 15000 mg/kg) according to the classification of substances toxicity by Sidorov K. [14]. Thus, the results of conducted research show no toxic and local irritant action “Imbyrol” phytogel in single skinapplication to rats.

4. Conclusion

Studies have shown that the complex of selected essential oils with selected concentrations has expressed antimicrobial and anti-inflammatory effects. It is proved that the developed gel has no toxicity.

5. References

2. Dragicevic-Curic N, Winter S, Krajsnik D. Stability evaluation of temoporfin-loaded liposomal gels for topical