P.aeruginosa) in general compounds are less active than against non-resistant bacterial strains. It should be mentioned that resistant strain P. aeruginosa in general was more sensitive to some compounds compared to other resistant strains.

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THE EFFECT OF PROPOLIS ON VIABILITY OF RESPIRATORY TRACT CELLS IN PATHOLOGICAL CONDITIONS

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Introduction. Infectious diseases are a significant problem affecting the public health and economic stability of societies all over the world. Respiratory tract infections are among the most common health pathologies. Antibiotics are usually prescribed to treat diseases caused by these microorganisms. It is important to emphasize that in recent decades, bacterial resistance to antimicrobial drugs has become an increasingly urgent problem: WHO states that bacterial resistance to antibiotics causes the death of as many as 33,000 people in EU countries every year [1]. In order to reduce the use of antibiotics, one of the possible alternatives is preparations of natural origin with antimicrobial effects.

One of the strongest natural antibiotics is propolis. The results of an antimicrobial study of propolis showed that it effectively inhibits the growth of Gram-positive and Gram-negative bacteria. It is especially important to emphasize that propolis contains several hundred biologically active compounds and many of them have an antimicrobial effect, which prevents the development of resistant forms of microorganisms. Rivera-Yañez with co-workers showed that the biologically active substances presented in propolis suppress pathogens that cause respiratory diseases [2]. In order to produce propolis preparations that are safe for consumption with maximum therapeutic effect, it is important to investigate and determine the concentrations of active substances, as well as the composition of excipients, which would be friendly to the tissues of the body and ensure the stability of the preparations.

Most of the biologically active substances found in propolis are lipophilic and easily soluble in polar solvents. However, ethanol and similar polar solvents have strong adverse effects on cells and tissues with which they contact; for this reason, the possibilities to use ethanolic extracts are limited. Aqueous extracts are the most tissue-friendly, but the amount of biologically active compounds in such preparations is 10-20 times lower compared to extracts made using polar solvents [3].

Aim of research. The aim of this work was to investigate the effect of hydrophilic propolis solutions on metabolic activity/viability of respiratory tract cells in pathological conditions.

Materials and methods. Aqueous (WEP), and aqueous with 20% PEG-400 additive (Pg-WEP) extracts were produced during the study. The phenolic compounds were determined by the Folin-Ciocalteu method. HBEC-3 cells were used for bioassays, and their metabolic activity in the presence of lipopolisaccharyde (LPS) and different concentrations (5-50 μg/ml PC) of investigated propolis solutions was assessed. Data analysis was performed by using SigmaPlot.

Results. LPS was used at concentration which caused 30 % decrease in cell metabolic activity. Two models were used in this experiment: (**I**) wells were enriched with LPS for 24 h, after this treatment different concentrations of hydrophilic propolis solutions were added and cell functions were investigated after 24 h; (**II**) cells were treated with different concentrations of WEP and Pg-WEP for 24 h, after that LPS was added and cell functions were measured after 24 h.

(**I**) The lowest amounts (5 and 10 μg/ml PC) of WEP had no effect, higher amounts (15-30 μg/ml PC) showed statistically significant increases in cell metabolic activity, and in the presence of the highest investigated amounts (40-50 μg/ml PC), cell viability was similar to that of control cells. Pg-WEP was more effective at smaller concentrations: only the smallest investigated amount (5 μg/ml PC) had no effect, 15 μg/ml PC and higher amounts of extract showed increase in cell metabolic activity if compare with cells treated only with LPS. In wells enriched with 30 μg/ml PC and higher cell viability was similar to that of control cells.

(**II**) Cells pretreated with low amounts (5-10 μg/ml PC) of WEP undergo LPS-mediated damage, similar to cells in which no extracts were presented. In the presence of extracts of 20-30 μg/ml PC, statistically significantly less damage was found. At the highest investigated amounts of extracts (40-50 μg/ml PC), the metabolic activity and viability of the cells were similar to the control samples. Cells pre-treated with smallest amount (5 μg/ml PC) of Pg-WEP showed decrease in metabolic activity by 25,5%. Cells, pre-treated with 10-30 μg/ml PC of Pg-WEP undergo damage only by 10-20%. In the presence of 40-50 μg/ml PC of this extract the metabolic activity of investigated cells was similar to control.

Conclusions. Hydrophilic propolis preparations used at 15 μg/ml PC and higher amounts have a protective effect on respiratory tract cells against damage caused by bacterial lipopolysaccharide. Pg-WEP in small concentrations was more effective if compare to WEP, it could be due to PEG penetration-improving properties.

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ПЕРЕСПЕКТИВИ ЗАСТОСУВАННЯ КОМБІНОВАНИХ ЕМУЛЬГАТОРІВ У ТЕХНОЛОГІЇ М'ЯКИХ ЛІКАРСЬКИХ ЗАСОБІВ

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Вступ. Застосування різноманітних емульгаторів дозволяє сьогодні представляти великий асортимент емульсійних кремів для косметологічних та клінічних потреб. При цьому виробниками пропонуються як окремі компоненти, так і комбіновані продукти, які містять декілька емульгаторів у складі.

Мета дослідження. Визначити перспективи застосування комбінованих емульгаторів для виготовлення м'яких засобів.

Методи дослідження. Аналіз асортименту емульгаторів на ринку з використанням інтернет-ресурсів та літературних даних.

Основні результати. Виявлено розповсюджені пропозиції таких комбінованих емульгаторів як Emulpharma 1000 (цетеариловий спирт, гліцерин стеарат, сорбітан стеарат, цетеарил глюкозид) утворює прямі емульсії, одержується із природної сировини (оливкової олії); [2,3] Emulpharma (Beautyderm) K10 (цетеарил глюкозид, сорбітан оливат, цетеариловий спирт) одержується із оливкової та пальмової олій; Amisol soft (бегеніловий спирт, гліцерин стеарат, лецитін, стероли соєві); Emulsiphos (калію цетил фосфат, гідрогенізовані пальмові гліцериди); Montanov 202 (арахіділовий спирт, бегеніловий спирт, арахіділ глюкозид); [1,3] Montanov 68 (цетеариловий спирт, цетеарил глюкозид); Olivem 1000 (цетеарил оливат, сорбітан оливат); Plantasens HE20 (цетеарил глюкозид, сорбітан оливат); Ercamulse NF V/FD (цетеариловий спирт, полісорбат 60); Ercamuls AE V/FD (гліцерил стеарат, цетеарет-20, цетеарет-12, цетеариловий спирт, цетил пальмітат); Plantaquat NC (цетеариловий спирт, лецитін, натрію цетеарил сульфат, рослинна олія); Emulsifiant Gelisucre BIO (гліцерин, олія солодкого мигдалю, сахарози лаурат, цитрусова вода), являє собою в'язку рідину. Для одержання емульсій оберненого типу представлені емульгатори Ecomuls (гліцерил олеат, полігліцерил-3-поліріцинолеат, фракція оливкової олії, яка не омилюється); Olivem 2090 (полігліцерил-4 оливат/полірицинолеат), являє собою рідину. Виробники пропонують додавати комбіновані емульгатори, в середньому, до 10% для одержання стабільної емульсії. [3-5]

Висновки. Аналіз пропонованих на ринку комбінованих емульгаторів демонструє перевагу компонентів для приготування прямих емульсій, але є і