Propolis, its antimicrobial properties and use in the treatment of gastritis and peptic ulcer L. B. Lazebnik, E.A. Dubtsova, V.I. Kasyanenko, I.A. Komissarenko

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Propolis is a product of the processing of sticky resin by bees, which they collect from the buds of trees (poplar, alder, birch, etc.) and from the resinous substances of pollen. Otherwise, propolis is called bee glue because of its qualities. By adding the secret of their glands to the resin of plant buds, bees complicate the chemical composition of propolis, making it unique. There are several interpretations of this term. One of them is of Greek origin and is translated as "pro" - in front of, in front and "poliso" - a city, a fortress. The other has Latin-Greek roots and comes from the word "propoliso", meaning "to cover up, close up" [24].

The bees in the hive use propolis as a building and embalming material. Propolis has been found to contain volatile essential oils that have antimicrobial properties. When the hive is heated by the sun, these oils evaporate, saturating the air inside, and thus act antiseptically, creating a sterile hive atmosphere.

The composition of propolis varies depending on the place and time of collection. Its main components are vegetable resins and balsams, accounting for more than 50%, the rest are essential oils (2-15%), wax (up to 25%) and mechanical impurities (no more than 20%), including pollen ( 5-11%).

The chemical composition of propolis is complex, diverse and is represented mainly by organic compounds - flavonoids, which make up more than 25% of all components, organic acids, aldehydes, ethers and esters, alcohols and phenols, minerals and amino acids, vitamins and trace elements.

The chemical composition of propolis determines its properties. Thanks to the organic compounds that make up propolis, its antimicrobial, antiviral and antifungal effects are ensured. It is believed that phenolic compounds, ferulic acid, caffeic and volatile benzoic acids have antimicrobial action in propolis [24]. It is known that phenol solutions have a pronounced bactericidal effect against vegetative forms of microorganisms. The medicinal properties of propolis are known and used by humans since ancient times. Propolis was used by the priests of Ancient Egypt for several millennia BC. It was in their hands that medicine, chemistry and the art of mummifying corpses were concentrated [24]. Description of propolis as a healing agent is found in the writings of Galen and Avicenna. They were treated for wounds, burns, skin diseases.

Reports on the antimicrobial properties of propolis have been found since the beginning of the 20th century, and in 1948 the works of V.P. Kivalkina, which proved the effectiveness of the antimicrobial action of propolis on 74 microbial strains.

The author has shown that different types of microorganisms exhibit varying degrees of sensitivity to propolis. For example, gram-positive flora is more sensitive to propolis than gram-negative ones. The bacteriostatic concentration of propolis for gram-positive bacteria ranges from 0.62-2.5 mg / cm3, and for gram-negative

- 40 mg / cm3 and more. Bactericidal doses of propolis are 2-8 times higher than bacteriostatic. Various microorganisms die at different times under the influence of propolis. For example, the causative agents of pig erysipelas die after 1-2 hours, staphylococci - after 2-4 hours, and sporeforming microbes did not die after 48 hours.

Antimicrobial components of propolis are heat-resistant, and storage of bee glue for 3-4 years does not reduce its antimicrobial activity.

Subsequently, many researchers have confirmed the antimicrobial efficacy of propolis. In the literature there are indications of the effect of propolis on mycobacterium tuberculosis, Staphylococcus aureus, hemolytic streptococcus. In high concentrations, propolis inhibits the growth of salmonella and paratyphoid pathogens. In addition, its effect on the herpes simplex virus, fungi (candidiasis and onychomycosis) and protozoa (trichomoniasis) has been established [4, 5, 7, 8]. However, the results of these studies are extremely difficult to generalize and compare, since there is no standard method for extracting propolis. Some authors use alcoholic solutions of propolis, others - water, and still others - oil.

The concentration of these solutions varies widely. In addition, propolis is distinguished by its heterogeneity in its composition, due to its geographical origin and characteristics of vegetation. Nevertheless, a number of authors have noted a higher antimicrobial activity of aqueous propolis solutions, compared with oil and alcohol solutions [12].

Propolis certainly has a less active antibacterial effect than antibiotics [2], but it is less toxic and does not create resistance to microorganisms. This property allows propolis to be used as an alternative therapy. There is a practice of using it for antibiotic-resistant staphylococcal infections [12]. Propolis, unlike antibiotics, does not inhibit the normal intestinal microflora and does not cause dysbiosis.

Moreover, a number of studies indicate its effective use for various disorders of the intestinal microbiocenosis [16, 21]. Studies carried out on the use of propolis in chronic inflammation of the biliary tract [2] have shown a positive effect of alcoholic extract of propolis, used as an antimicrobial and antiprotozoal drug, against streptococcus, staphylococcus, Escherichia coli, Proteus. The bactericidal effect was obtained in 46.6% of patients. However, the authors noted that antibiotic treatment was more effective. No toxicity was observed.

In addition, the antimycotic effect of propolis was established [4, 24] and it was shown that the combination of propolis preparations and antimycotic drugs potentiates the effect of the latter [7]. Also described is the antiprotozoal effect of propolis against urogenital infections [5] and the antiviral effect of propolis in the treatment of herpes simplex virus [3].

For many years, propolis has been used in the treatment of gastric ulcer and duodenal ulcer as an analgesic and tropho-granulation agent. In addition, propolis has the ability to form a protective film on the wound surface, to act anti-inflammatory and antispasmodic [24].

In the early 1980s, Barry B. Marshall and Robin Warren (Australia), while studying the microflora of the stomach, identified a new microorganism, Helicobacter pylori (Hp), which was later recognized as one of the etiological factors in the development of peptic ulcer and chronic gastritis [6]. Therefore, the treatment of these diseases recently includes the appointment of two antibacterial drugs. The question of the possibility of the effect of propolis as an antibacterial drug on Helicobacter pylori (Hp) has not been studied, therefore it was the basis of our study.

Purpose of work: determination of sensitivity Helicobacter pylori to propolis in laboratory conditions and the possibility of eradication of Helicobacter pylori using an aqueous extract of propolis.

The experimental part of the study was carried out on the basis of the laboratory of LLCLitekh. In order to conduct the study, at its first stage, the protocol for the preparation of a 30% aqueous propolis extract in laboratory conditions was standardized,

obtained by holding the crushed propolis powder in a water bath for 60 minutes.

The resulting solution was subjected to double filtration through a paper filter and subsequent sterilization. The true concentration of the aqueous solution was determined by evaporating the obtained extract on a rotary evaporator. The concentration of dry matter in the solution obtained from different extractions ranged from 1.7% to 2.1%. The work was carried out on three Helicobacter pylori strains: two laboratory strains (26695 and J99 with a known nucleotide sequence of genomes) and one clinical isolate isolated from a patient with chronic H. pylori gastritis.

The minimum inhibitory concentration of propolis was determined by the serial dilution method. For this, a daily culture of Helicobacter pylori (~ 106 CFU inoculum) was inoculated in 1 ml of liquid nutrient medium containing various concentrations of propolis, and incubated at 37-C in an atmosphere of 5% CO<sub>2</sub>...

The growth of the culture was assessed after two days. At a concentration of dry matter of propolis from 0.02% to 0.06%, the growth of all Helicobacter pylori strains remained both in a liquid medium and after incubation with propolis. At a dry matter concentration of 0.08%, the growth of all Helicobacter pylori strains in a liquid medium was significantly reduced, and remained after incubation. At a dry matter concentration of 0.10%, only the laboratory J99 strain continued to grow after incubation, while its growth in a liquid medium was weak. At a concentration of dry matter of propolis in the cultivation medium of 0.12% –0.14%, no growth of any of the strains was observed either in a liquid medium or after incubation with propolis (Table 1).

Table 1

Содержание сухого вещества прополиса в среде культивиро- вания Нр	Рост Нр 26695		<b>Рост Нр Ј99</b>		Рост Нр - клинический изолят	
	В жидкой среде с про- полисом	После инкубации с прополисом	В жидкой среде с прополи- сом	После инкубации с прополисом	В жидкой среде с про- полисом	После инкубации с прополисом
0,02%	+	+	+	+	+	+
0,04%	+	+	+	+	+	+
0,06%	+	+	+	+	+	+
0,08%	+/-	+	+ сл.	+	+/-	+
0,10%	-		+/-	+		-
0,12%	-		-			-
0,14%	-	_	-	_	_	-

## The minimum inhibitory concentration of propolis in various crops Helicobacter pylori

Thus, inhibition of the growth of Helicobacter pylori was observed at a concentration of propolis in the cultivation medium of more than 0.1% of dry matter.

The experiments were performed in triplicate with solutions from three different extractions.

During the study, there were no significant differences in growth inhibition between laboratory strains and clinical isolate. For all strains, the minimum inhibitory and minimum bactericidal concentrations of propolis coincided. Thus, it was observed that propolis has an activity inhibiting the growth of Helicobacter pylori.

Considering the results in vitro, an attempt was made to usepropolis as an antimicrobial agent for patients with duodenal ulcer and chronic gastritis associated with Helicobacter pylori during anti-Helicobacter therapy. 56 patients were examined. Of these, 31 patients received a 30% aqueous solution of propolis in the amount of 100 ml twice a day for 2 weeks. The control group consisted of 25 patients who received clarithromycin 1000 mg / day. and amoxicillin 2000 mg / day.

The results obtained determined the level of eradication in the main group - 61.3%. In this case, eradication occurred in cases of low and medium degree of Hp contamination of the gastric mucosa. In the remaining 38.7% of cases, there was a decrease in the level of Hp contamination of the gastric mucosa from high to low. In the control group, the level of eradication was 92.0% (Fig. 1).



эрадикация нет эрадикации

Rice. 1 level of eradicationHelicobacter pylori in the study (n = 31) and control (n = 25) groups.

Conclusion: in some cases, with intolerance to antibacterial chemotherapy drugs, 30% propolis extract can be used in the treatment of diseases associated with Helicobacter pylori, as monotherapy. At the same time, the level of eradication is 61.3%.

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