

ХИМИЧЕСКИЕ НАУКИ

SYNTHESIS AND STUDY OF BIOLOGICALLY ACTIVE ADDITIVES FOR ANTIBACTERIAL COMPOSITION MATERIALS

Guliyeva Shahana Israil

*Assistant of Azerbaijan Medical
University, Baku*

Alikhanova Aygun Iltam

*Scientist of Institute of Polymer Materials,
NAS of Azerbaijan, Sumgait*

СИНТЕЗ И ИЗУЧЕНИЕ БИОЛОГИЧЕСКИ АКТИВНЫХ ДОБАВОК ДЛЯ МАТЕРИАЛОВ АНТИБАКТЕРИАЛЬНОЙ КОМПОЗИЦИИ

Гулиева Шахана Исраиль

*ассистент Азербайджанской Медицинской
Университет, Баку*

Алиханова Айгюн

*Научн. сотрудник Института Полимерных
Материалов, НАН Азербайджана, г. Сумгаит*

Abstract

In the presented article the antibacterial properties of maleimide derivatives of aminosalicilyc acids were compared. Primary antibacterial and antifungal derivatives of the presented preparations were studied by diffusion method.

As a result of the research, it was found that the presented maleimide derivatives of the ortho-, meta-, and para-aminosalicylic acids had an active influence on the cultures of individual concentrated microorganisms, whereas the sterile distilled water exhibited poor antimicrobial activity. By comparison, the influence of all three substances on fungal cells (*C.albicans*) was more effective.

Аннотация

В представленном статье сравнивались антибактериальные свойства малеимидных производных аминсалициловых кислот. Первичные антибактериальные и противогрибковые производные представленных препаратов были изучены методом диффузии.

В результате проведенных исследований было обнаружено, что представленные малеимидные производные орто-, мета- и парааминосалицилов оказывали активное влияние на культуры отдельных концентрированных микроорганизмов, в то время как стерильная дистиллированная вода проявляла слабую антимикробную активность. Для сравнения, воздействие всех трех веществ на клетки грибов (*C.albicans*) было более эффективным.

Keywords - antibacterial polymer additives, antibacterial composition materials, cyclic imides, antimicrobial and fungicidal properties

Ключевые слова - антибактериальные полимерные добавки, антибактериальные композиционные материалы, циклические имиды, антимикробные и фунгицидные свойства

INTRODUCTION

In recent years, the achievements of polymer chemistry have taken a wide place in solving various important problems in medicine, agriculture and other fields. The presence of antibacterial properties in polymeric materials (PM) in addition to their physical – chemical and mechanical properties is also an important issue.

As it is known, the polymer materials are subjected to biocorrosion under the influence of microbes and microfungi. Sometimes, the polymers themselves become microbial centers. Therefore, it is necessary for polymeric materials to have antimicrobial protection [1].

Depending on the application area, different methods are used to obtain antibacterial polymeric materials. One of these methods is the supplementation of appropriate antibacterial compounds – additional

into the finished polymer materials during the processing phase. Thus, more than 3,000 antibacterial compounds have been tested in various polymeric materials [2].

At present, polymer compositions (PC) with different properties have been obtained by varying the type and amount of additives included in the PM [3].

Among organic antiparasitics, a wide range of antiseptics are widely used salicylic and other derivatives of salicylic acid. It should also be noted that the compounds that hold the salicylic group are non-toxic to human and animal organisms [4]. Alkyl esters of salicylic acid have many advantages, such as antimicrobial substance: poorly soluble in water, highly antibacterial and inexpensive [5].

In previous studies, have reported in the literature on unsaturated derivatives of salicylic acid [6] and cyclic bisimides [7] and their antibacterial composition

materials. In the presented article, the antibacterial properties of maleimide derivatives of aminosalicyclic acids were comparatively characteristic.

The purpose of this article is to preparation and study the antibacterial polymer composition materials from these compounds.

EXPERIMENTAL PART

The disc-diffusion method was used to study the initial antibacterial and antifungal effects of the presented substances [8].

To study these properties, Staphylococcus aureus (gold staphylococci), Gram-negative bacteria, Escherichia coli (Gastrointestinal Bacteroids), Pigmentus, as representative of Gram positive bacteria, the main contributors to purely inflammatory processes commonly used as culturas; Candida albicans, Candida albicans (Candida), representative of fungus, Bacillus anthracoides as representative of sporadic gram-positive bacteria, Klebsiella pneumonia as representative of capsular bacteria.

Disc-diffusion method is prepared from microorganisms daily culture, 1 ml microbe cell

suspension per 1 ml, which is less than 1 mL of standard microbial culture on a sterile physiological solution and dissolved in 1 ml. is delivered. Separate microbial suspension is then poured into the Petri bowls, with the APA (Meat-Pepton Flow) and Saburo White. The bowls are moved so that the suspension is spread evenly. The residual suspension is then absorbed through a pipette and thrown into the disinfectant. The cups are kept at 37°C for 10 min. to allow the solution to dry slightly. The cups are then removed from the thermostat and sterilized discs preheated on sterile essential oil for 3 to 5 minutes are placed on the surface of the microbial germinating environment, with the pinset gently pressed so that the disks are well warmed. Subsequently, the PPA bowls are placed at a temperature of 37°C and the Saburo plantings at a temperature of 28°C. As the disks are dispersed, the substance injected differs into the agar and kills the germ. After 24-48 hours the bowls are removed from the thermostat and the results are recorded.

RESULTS AND DISCUSSION

The results are presented in Table 1.

Table 1

Antimicrobial effects of synthesized compounds and controls

Test-cultures	ortho-salicylic maleinimide		meta-salicylic maleinimide		para-salicylic maleinimide	
	Sterile distilled water-soluble	Concentrator (with sterile distilled water immersion disc)	Sterile distilled water-soluble	Concentrator (with sterile distilled water immersion disc)	Sterile distilled water-soluble	Concentrator (with sterile distilled water immersion disc)
St.aureus	3 mm	16 mm	0 mm	6 mm	0 mm	5 mm
E.coli	2 mm	20 mm	0 mm	8 mm	0 mm	6 mm
Ps.aeruginoza	0 mm	5 mm	0 mm	0 mm	0 mm	0 mm
C.albicans	8 mm	25 mm	6 mm	24 mm	5 mm	28mm
Kl.pneumoniae	3 mm	18 mm	0mm	10 mm	3 mm	3 mm
B.anthracooides	0 mm	21 mm	0mm	20 mm	0 mm	19 mm
Kontrol(etanol)	3 mm	3mm	3 mm	3mm	3 mm	3mm

Note: Figures show the diameter of microbial zones in mm. All experiments were repeated 3-5 times.

Conclusion

Studies showed that, distributed ortho-, meta-, and para-salicylimide derivatives exhibited active effect on selected microorganism cultures in concentrate, on the other hand, showed weak antimicrobial activity in sterile distilled water. As a comparison, all three compound were more effective on fungal cells.

References:

1. Штильман М.И. Полимеры в биологически активных системах // Соросовский образовательный журнал, 1998, №5, с. 48-54
2. Shtilman M.I. Polymers of medical-biological purpose. Moscow: Akademkniga Publ. 2006, 420 p.
3. Алехин, Е.К. Аспирин: новая жизнь старого лекарства / Е.К. Алехин // Соросовский образовательный журнал — 1999. — №7. — С. 85-90
4. Kennedy J. F., Barker S.A., Epton J., Kennedy G.R. Poly-(4-and 5-acrylamidosalicylic acids). Preparation and properties // Chem. Soc., Perkin Trans. I., 1973, 20:2293–2299

5. Abbasova L.Sh., Rasulzadeh N.Sh., Mammadov B.A., Zeynalova C.Q., Rasulov N.Sh. The Influence Of The Structure Of Salicylic Acid Derivatives To Their Biological Activity // Национальная Академия Наук Азербайджана- Молодой ученый и специалист. молодых исследователей, Научно-практический журнал, 2018, IV,№2, с.44-48.

6. Расулзаде Н.Ш., Сафарова Г.М. Синтез и исследование потенциальных биологически активных олигоалкиловых эфиров ацетилсалициловой кислоты // Евразийский Союз Ученых, 2017, № 5 (38), с. 76-79

7. Alikhanova A.İ. Rasulzadeh N.Sh., Zeynalova S.Q., Rasulov N.Sh. Investigation of the antibacterial properties of polychlorinated cyclic bisimides // SSRG International Journal of Chemical Engineering Research- 2019, Volume 6, Issue 1, p. 4-6

8. Позднеев О.К. Медицинская микробиология. М., 2001