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Sonnenbrink 20

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Inhaber: Marina Kisiliuk

Tel.: + 49 51519191533

Fax.: + 49 5151 919 2560

Email: info@dwherold.de

Internet: www.dwherold.de

Chefredakteur/Editor-in-chief:

Marina Kisiliuk

Korrektur:

O. Champela

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jurgabernatoniene@yahoo.com

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shota.samsonia@tsu.ge

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aprokharau@gmail.com

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wlad_cor@mail.ru

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algiv@rambler.ru

Makarevich A., MD, PhD, Prof.
Theraphy, Belarus
makae@bsmu.by

Kanunnincova N., BD, Prof.
Physiology, Belarus
n.kanunnikova@grsu.by

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Internal Medicine, Lithuania
Giedrius.Vanagas@lsmuni.lt

Armuntas Baginskas, Prof.
Neurofiziologija, Lithuania
Armuntas.Baginskas@lsmuni.lt

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Ricardas.Radisauskas@lsmuni.lt

Meyramov Gabit, Prof.
Cytology and Histology, Kazakhstan
meyramow@mail.ru

Aisha Mohammed Abd al-salam Shahlol
Ph.D. in Medical Bacteriology, Libya
Ais.shahlol@sebhau.edu.ly

Edmundas Kadusevicius, MD, PharmD, PhD, Prof.
Pharmacology, Lithuania
Edmundas.Kadusevicius@lsmuni.lt

Ivo Grabchev, Prof., PhD.
Chemistry, Bulgaria
i.grabchev@chem.uni-sofia.bg
grabchev@mail.bg

Mariyana Ivanova Lyubenova, Prof., PhD.
Ecology, Bulgaria
ryann@abv.bg
ryana_1@yahoo.com

Tsvetanka Tsankova Marinova, MD, PhD, DMedSci,
Biologv. Bulgaria
tmarinova@yahoo.com

Evgueni D. Ananiev, Prof PhD,
Biology. Bulgaria
evgueni_ananiev@yahoo.com

Plamen G. Mitov, Prof., PhD.
Biology, Bulgaria
mitovplamen@gmail.com

Atanas Dimov Arnaudov, Ph.D.
Physiology, Bulgaria
arny87@yahoo.co.uk

Iliana Georgieva Velcheva, PhD,
Ecology, Bulgaria
anivel@abv.bg

Osman Demirhan, Prof.
Biology, Turkey
osdemir@cu.edu.tr

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Neurogenetics, India
Indijharnaray@gmail.com

Marián Halás doc. RNDr, Ph.D.
Human geography, Czech
marian.halas@upol.cz

Ayfer Pazarbasi Prof.Dr.
Biology, Turkey
payfer@cu.edu.tr

Tusharkanti Ghosh Prof.
Physiology, India
tusharkantighosh53@yahoo.in

Khudaverdi Gambarov Gambarov, Prof.
Microbiology, Azerbaijan
khuda1949@mail.ru

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hrovshan@hotmail.com

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Theology, Wells, Maine, USA
djtjohnson@earthlink.net

Satanovsky Leon MD/PhD.
Perio-odontologie, Israel
satleonid@gmail.com

Lists of references are given according to the Vancouver style

**Kotelban A.V.,
Godovanets O.I.,
Burdeniuk I.P.**

*Department of Surgical and Pediatric Dentistry of the Chernivtsi Higher State Educational Establishment of Ukraine
"Bukovinian State Medical University", Chernivtsi, Ukraine*

PECULIARITIES OF ADMINISTRATION OF ANTISEPTIC DRUGS IN CHILDREN SUFFERING FROM CHRONIC CATARRHAL GINGIVITIS UNDER CONDITIONS OF DIABETES MELLITUS

Abstract. *The analysis of the sensitivity of the microflora of the oral cavity of children with chronic catarrhal gingivitis under conditions of diabetes reflects the high efficiency of bactericidal action of surface-active preservatives in a wide range of opportunistic pathogens. Intermediate sensitivity of bacterial strains research to action "Dekasan" in terms of in vitro $17,13 \pm 4,01$ mg/ml. In the presence of "Chlorhexidine bihlyukonatu" should be 2 times higher concentration.*

Keywords: *children, gingivitis, diabetes, "Dekasan" "Chlorhexidine bihlyukonat".*

Introduction. Diseases of the periodontal tissues among children population is an important and complicated issue in dentistry. Scientific literature presents certain evidence of the main causes of gingivitis development, a leading role among which belongs to disorders of microbiocoenosis in the oral cavity [2, 6].

The transmission from a healthy condition to the development of diseases of the periodontal tissues is accompanied by a successive change of microflora: from facultative and gram-positive kinds of bacteria to anaerobic and proteolytic gram-negative bacteria [1, 8]. In the result of active secretion of various enzymes microorganisms promoting the development of microcirculatory disorders of the periodontal tissues trigger a number of inflammatory reactions, cause depolymerization of glycosaminoglycans, proteins of the periodontal tissues, initiate hypoxia of the tissues [6, 7, 9]. At the same time, severity of the inflammatory process and its clinical-morphological peculiarities determine the patient's organism reactivity. The qualitative and quantitative content of the oral microflora are altered against the ground of comorbid somatic pathology complicating the course of periodontal tissue diseases [2, 10].

Due to variability of representatives of the oral microbiocoenosis various antiseptic means of a wide spectrum of action, enzymes, fungicides, anti-protozoal drugs and antibiotics are administered for the treatment of gingivitis [1, 3, 4].

The most effective antiseptic means are superficially active substances. Their mechanisms of action are based on diphylic structure of the molecule and ability to a destructive effect on the prokaryote membrane. The drugs of this class are of a wide spectrum of antimicrobial action involving gram-positive and gram-negative bacteria, fungi-dermatophytes, yeast-like fungi, protozoa, chlamydia, and even complicated viruses (causative agents of hepatitis, HIV) [1, 4]. Resistance of microorganisms to these drugs is formed slowly. They possess a property to increase susceptibility of microorganisms to other antimicrobial means in sub-bacteriostatic concentrations [3]. From the mentioned group of drugs the pharmaceutical market presents the solution "Chlorhexidine gluconate" 0,05 % and «Decasan» — 0,02 % solution of decamethoxin isotoned by sodium chloride [3, 5]. Therefore, investigation of susceptibility of the oral microflora to the action of widely spread antiseptics is a topical issue.

Objective: to determine susceptibility of the oral microflora in children suffering from chronic catarrhal gingivitis (CCG) under conditions of diabetes mellitus (DM) to the action of antiseptic drugs "Decasan" and "Chlorhexidine gluconate" in the experiment.

Materials and methods. The serial industrial samples of medical means «Decasan» 0,02 % solution and "Chlorhexidine gluconate" 0,05 % solution were used in the study. Susceptibility of

the isolated strains of microorganisms from the oral cavity of children suffering from CCG under conditions of DM (284 strains) to the action of the examined drug – decamethoxin and antiseptic compound – chlorhexidine bigluconate was investigated by means of two-phase serial dilution in liquid nutrient media optimal for the growth of the examined test-cultures under conditions in vitro.

The results obtained were statistically processed by means of the licensed program «Statistika 6.0». The mean value (M), mean accuracy (m), reliability of statistical indices (p)

were estimated.

Results and discussion. The level of bactericidal concentration reflects the susceptibility of microorganism strains isolated from children suffering from CCG and DM to the main active substance of antiseptic preparations under conditions in vitro.

The Table presents the results of detection the susceptibility of microorganism strains isolated from children suffering from CCG under conditions of DM to “Decasan” and “Cholrhexidine bigluconate”.

Table

Susceptibility of the oral microflora in children suffering from CCG under conditions of DM to the action of antiseptics

№	Test-cultures of microorganisms	Number of examined strains of microorganisms	Antiseptic compound			
			«Decasan»		«Cholrhexidine bigluconate»	
			Bacteriostatic (BSC) and bactericidal (BCC) concentrations, mkg/ml			
			BSC	BCC	BSC	BCC
1.	Streptococcus pyogenes	20	1,06 ±0,32	2,12 ±0,74	1,52 ±0,48	3,03 ±0,34
2.	Streptococcus faecalis	6	19,53 ±3,46	39,06 ±7,81	23,43 ±7,81	46,87 ±15,62
3.	Streptococcus anginosus	4	1,11 ±,37	1,22 ±0,74	1,4 ±0,48	2,92 ±0,97
4.	Streptococcus salivarius	18	1,06 ±0,15	2,12 ±0,37	1,53 ±0,19	3,06 ±0,39
5.	Staphylococcus aureus	22	0,88 ±0,19	1,96 ±0,38	1,65 ±0,14	3,31 ±0,29
6.	Staphylococcus epidermidis	10	0,17 ±0,03	0,34 ±0,07	0,22 ±0,02	0,45 ±0,03
7.	Escherichia coli	30	17,8 ±3,27	35,8 ±6,53	26,44 ±2,68	52,88 ±4,16
8.	Neisseria oralis	6	0,65 ±0,16	1,3 ±0,33	1,31 ±0,16	1,62 ±0,32
9.	Neisseria elongata	4	1,47 ±0,49	2,93 ±0,98	1,72 ±0,17	3,55 ±0,35
10.	Proteus mirabilis	3	46,4 ±15,7	93,8 ±31,3	62,5 ±10,41	137,0 ±12,5
11.	Proteus zettgeri	2	15,6 ±5,75	31,25 ±10,25	31,25 ±15,62	62,5 ±10,41
12.	Pseudomonas aeruginosa	6	20,85 ±5,2	41,7 ±10,4	26,04 ±5,21	52,08 ±10,41
13.	Candida albicans	19	1,19 ±0,19	2,39 ±0,38	1,75 ±0,16	3,41 ±0,32
14.	Candida tropicalis	12	0,82 ±0,15	1,94 ±0,37	1,56 ±0,24	3,12 ±0,47
15.	Candida krusei	2	0,87 ±0,15	1,95 ±0,37	1,95 ±0,37	3,9 ±0,53
16.	An average level of susceptibility	164	8,63 ±1,98	17,13 ±4,01	12,21 ±1,14	25,51 ±2,24

Among the representatives of the genus streptococci the most tolerant to the action of antiseptics was *Str. faecalis*, the bactericidal action of «Decasan» for it was $39,06 \pm 7,81$ mkg/ml, and «Chlorhexidine bigluconate» — $46,87 \pm 15,62$ mkg/ml. *Str. anginosus* manifested the highest susceptibility to «Decasan» ($1,22 \pm 0,74$ mkg/ml), twice as low — to «Chlorhexidine bigluconate» ($2,92 \pm 0,97$ mkg/ml). *Str. salivarius* and *Str. pyogenes* manifested a high susceptibility to «Decasan» — $2,12 \pm 0,37$ mkg/ml and $2,12 \pm 0,74$ mkg/ml, but susceptibility to «Chlorhexidine bigluconate» was also rather high — $3,06 \pm 0,39$ and $3,03 \pm 0,34$ mkg/ml. The data obtained enable to consider these antiseptics highly effective concerning the examined microorganisms.

Staphylococcus aureus presented the highest susceptibility to «Decasan» and died at the presence of $1,96$ mkg/ml of decamethoxin. To kill this kind of microorganisms twice as much concentration of «Chlorhexidine bigluconate» is necessary. The susceptibility of epidermal staphylococci to «Decasan» and «Chlorhexidine bigluconate» did not differ reliably. Therefore, concerning this genus of microorganisms «Decasan» appeared to be practically in 3,5 times more active than «Chlorhexidine bigluconate».

Gram-negative opportunistic microorganisms of the enteral bacteria genus presented less susceptibility to the examined drugs than staphylococci. Thus, *Escherichia coli* died at the presence of $35,8 \pm 6,53$ mkg/ml of decamethoxin, chlorhexidine — $52,88 \pm 4,16$ mkg/ml.

Similar tendency was observed for *Proteus* as well. Bactericidal concentration of «Decasan» for *P. mirabilis* and *P. zettgeri* was $93,8 \pm 31,25$ and $31,25$ mkg/ml. These microorganisms died at the presence of chlorhexidin of a twice higher concentration.

Staphylococci and enteral bacteria play a leading role in the development of inflammatory diseases of the periodontal tissues, and therefore the efficacy of antimicrobial means is first of all evaluated by the influence on the representatives of these groups of microorganisms.

In recent years the representatives of the genus *Pseudomonas* are the most spread and highly resistant to antimicrobial means. The examined strains *Pseudomonas aeruginosa* appeared to be more tolerant to the action of

antiseptics than staphylococci and enteral bacteria. BCC of «Chlorhexidine bigluconate» for them was $52,08 \pm 10,41$ mkg/ml. The representatives of this genus presented the highest susceptibility to «Decasan» (BCC — $41,7 \pm 10,4$ mkg/ml).

The medical forms of «Decasan» (0,02% solution or 200 mkg/ml) and «Chlorhexidine bigluconate» (0,05% solution or 500 mkg/ml) even within the limits of standard deviations contain sufficient concentration of the main active substance to ensure a destructive action on the isolated strains of any representative of *Pseudomonas*.

Yeast-like fungi of the genus *Candida* are an integral constituent of opportunistic oral microflora of a healthy individual. Among the drugs examined the lowest BCC for *Candida* was for «Decasan» (*C. albicans* — $2,39 \pm 0,38$ mkg/ml, *C. tropicalis* — $1,94 \pm 0,37$ mkg/ml, *C. krusei* — $1,95$ mkg/ml). To kill yeast-like fungi twice as much concentration of «Chlorhexidine bigluconate» is required. It should be noted that concentrations of antiseptics in all the examined medicinal forms were considerably higher than the indices of susceptibility of the examined fungal strains considering individual strain deviations.

The conducted analysis of susceptibility of the oral microflora of children suffering from CCG under conditions of DM reflects a high efficacy of bactericidal action of the superficially active antiseptics of a wide spectrum on opportunistic microorganisms. An average level of susceptibility of the examined bacterial strains to the action of «Decasan» under conditions in vitro is $17,13 \pm 4,01$ mkg/ml. With «Chlorhexidine bigluconate» twice as much concentration is required.

Choosing an antimicrobial compound in the content of a ready medicinal form BCC of the main active substance should be considered for every specific clinical strain of microorganisms. Under clinical conditions activity of an antiseptic compound decreases due to the impact of biological fluids, sorption properties of the body tissues and other factors requiring a considerable safety factor in the concentration of a substance in a ready medicinal form as compared to the bactericidal concentration.

Conclusion. A high efficacy of administration of the antiseptic «Decasan» is proved in the

treatment of CCG in children against the ground of DM. BCC of the antiseptic preparation for any of the examined microbial strains was less than the content of the main acting substance in ready medicinal forms, although the level of susceptibility of separate kinds differed considerably.

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CONTENT:

Yasnikovska S.M. Peculiarities of pregnancy progress in women with corrected isthmic-cervical incompetence	3
Shkolnikov V.S., Zalevskiy L.L., Zalevska I.V. Structural organization of the cerebellum of 17-18 week human fetuses during intrauterine development	5
Khmara T.V., Okrim I.I., Biriuk I.G., Komar T.V., Khmara A.B. The specialization degree of wood-destroying basidial fungi on trees in samur-davachi lowland forests of azerbaijan	10
Tkachenko P.V. Clinical-morphological prognostic characteristics of prostate cancer	14
Sasina O.S. Psychohygienic aspects of training of disabled adolescents with pathology of the vision (literature review)	19
Banul B.Yu. Development of paramesonephric ducts and their derivatives at the end of embryonic period of human ontogenesis	23
Niankovskiy S.L., Gorodylovska M.I. Heterogeneity of esophagitis in schoolchildren	26
Yevtushenko I.Y, Padalitsa M.A, Goryainova G.V. Age features of cervical arch and height of human renal calyces in mature and elderly ages	32
Vepruk Y., Rohovyy Y., Tovkach Y., Rykhlo I. Characteristic of aluminum salts influence on indexes of ion regulative renal function in mature and immature rats against the background of the pineal gland hyperfunction	35
Zakharchuk O.I., Kryvchanska M.I. Chronoregulating and rhythm-stabilizing role of melatonin in seasonal structure of circadian rhythms of non-specific immunity indices with aging	38
Kachko G.O., Omelchenko E.M., Pedan L.R., Polka O.O. Characteristics of congenital pathology with inherited and multifactorial nature in children of Kyiv region	41
Kosilova S.Y. Metabolic disorders in women depending on menopause duration	44
Kotelban A.V., Godovanets O.I., Burdeniuk I.P. Peculiarities of administration of antiseptic drugs in children suffering from chronic catarrhal gingivitis under conditions of diabetes mellitus	47
Reshetilova N.B., Navarchuk N.M., Popeliuk O.-M.V., Glubochenko O.V., Kulish N.M. Topographic peculiarities of the anterior cerebral vesicle on the 4th week of the embryonic period	51
Fik V.B., Paltov Y.V., Lohash M.V., Kryvko Y.Y. Peculiarities of morphological manifestation of the periodontal tissue in experimental animals against the ground of a short-term effect of opioid analgesic	54
Khomenko V.G. Renal tissue fibrinolysis against the ground of stress and xenobiotics	59
Dudenko V.G., Vdovychenko V.Yu., Kurinnoy V.V. Spatial topography of the diaphragm in the sagittal plane in women	61
Avdieyev Oleksandr, Dziubak Sergii Epidemiological analysis of dental diseases among individuals exposed to unfavourable psychoemotional surroundings	65
Andriets M. M., Andriets V.I. Psychological aspects of physical culture and sport	68
Malanchuk L.M., Kryvytska G.O. Renal tissue fibrinolysis against the ground of stress and xenobiotics	71
Bambuliak A.V., Galagdina A.A., Boychuk O.M. Diagnostics of the frontal sinus development with adjacent structures in the prenatal period of human ontogenesis	73
Kryvetskyi V.V., Narsiya V.I., Kryvetskyi I.V. Blood supply of the cervical region of the vertebral column during the fetal period and in newborns	76
Pavlovych L.B., Bilous I.I. The indicators of stimulation electroneuromyography in patients with diabetic polyneuropathy	80



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