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Characteristics of the “Yagel” Preparation Antimicrobial Activity at the Edge Gingival Inflammation

ABSTRACT

The prevalence and intensity of parodontium diseases among children of school age and also teenagers of educational institutions of Yakutsk have been studied. Their high level of frequency in these examined groups where mostly chronic catarrhal gingivitis and rarer localised chronic periodontitis of mild case were defined. On the other hand, the unsatisfactory oral cavity hygiene was revealed in these groups of children that accordingly characterized insufficient level of sanitary culture of children and their parents. We’ve chosen preparation "Yagel" for the research. It is made of native vegetative raw materials of frond lichens extract of Cladina family. It has a high maintenance of usnicand other lichen derivative acids in clathrate shape with lichen β - oligosaccharides and possesses the antimicrobial action which hasn’t been studied earlier in clinical dentistry. Taking it into account we’vestudied antibiotic action of "Yagel" to conditional-pathogenic microflora incase of gingivitis. The microbiologicassessment of this medication has revealed certain features of minimum inhibiting concentration and minimum bactericidal concentration. So, the use of "Yagel" affected on quantitative and quality indicators of gram-positive, gram-negative microorganisms and also Candidainfection. The revealed inhibiting and bactericidal concentration of "Yagel" allowed to assert that it could promote reverse development of inflammatory process of gum tissues in the clinical plan and accordingly, reduce period of treatment and help treatment-and-prophylactic efficacy. In this connection this preparation could be applied in complex gingivitis therapy as alternative medication. Thus "Yagel" is produced in Yakutsk that defines its low cost price and availability for a wide range of the population. There is a necessity of further researches of clinical efficacy of "Yagel" in pathological processes of parodontium tissues of inflammatory-destructive character.

Keywords: gingivitis, periodontitis, hygiene index, sanitary culture, dental help, lichen extract, microorganisms, nutrient medium, antimicrobial action.

INTRODUCTION

Nowadays parodontium diseases are still topical problem of dentistry and medicine that is wide spread and unsolved problem of treatment and prevention [4, 7]. Thus one of principal causes of teeth loss are parodontium illnesses of inflammatory-destructive and exchange-

dystrophic character that is frequently in the form of chronic oral cavity infection promote development of the focus-caused diseases of parenchymatous organs [2, 8].

It is necessary to note that a bad oral cavity hygiene where initial signs of irritation and inflammation are hyperemia, hypostasis and bleeding [1] has the special role in the development of inflammatory process of marginal gum. Further there is a clump of microbes in the form of tooth plaques with admixed gram-positive and gram-negative bacteria, fungus, etc. [5]. The substantial growth of gram-negative rods happens in subgingival microflora at the long gingivitis treatment. Feature of anaerobes and saprophytic microorganisms in the development of inflammatory gum process are allocation of ectotoxins and endotoxins which damage cells, connective tissue formations and basic substance which, as a rule, are connected with the decrease of specific and nonspecific mechanisms of native and general organism reactivity [3, 6].

Unsolved problems of gingivitis prevention and treatment dictate the necessity of constant search of new effective remedies and methods. Thus studying and assessment of the antimicrobial action of "Yagel" to microflora in inflammatory diseases of parodontiumtissues has important theoretical and practical value in dentistry, especially when similar researches have not been made earlier.

Research objective: to define the minimum inhibiting and minimum bactericidal concentration to microorganisms in inflammatory process of marginal gum on the basis of themicrobiologic analysis of results of the antimicrobial action of "Yagel".

MATERIAL AND METHODS

The complex clinical-epidemiological research of 1853 schoolboys at the age from 7 till 17 years in schools №9, 30 and 31 of municipal district "city Yakutsk" have been done at the first stage. The special card, recommended byWHO (1997) was used for the assessment of dental status. The hygienic state of oral cavity was defined by index IGR-U (1964). Prevalence and severity of parodontium tissues diseases were defined by index PMA (Parma, 1960).

The second stage included the assessment of the antimicrobial action of "Yagel" in case of gingivitis. The research was made on the basis of studying-scientific microbiologicclinicallaboratory of medical institute of the North-eastern federal university named after M.K.Ammosov. Material from the inflammatory locus of sulcus gum in gingivitis has been received by means of a tampon which was placed intransport medium with coal.

Primary materialinoculation was carried out on anaerobic blood agar, "chocolate" agar and Saburo medium. Incubation of inoculation was carried out at 37^0C during 24-48 hours. Plates

with anaerobic gemagar were incubated in air-locked containers for gas generators atmosphere and anaerobic atmosphere «GENbagAnaer» (Bio-Merieux). Inoculation on "chocolate" agar were also placed in air-locked containers, but with gas generators for micro obligate aerobes «GENbagMicroaer» (Bio-Merieux).

Inoculation for calculation of microorganisms’quantity was made byMelnikova-Tsareva method: a tampon put inoculatedmaterial on the 1st sector of Petri dish with a nutrient medium. After that a bacteriological loop in diameter of 3 mm made 4 shaped inoculations from the 1st sector into the 2nd, then from the 2nd sector into the3rd, burning a loop after reinoculation of each sector. Quantity of bacteria in the material was defined by means of the special table. Identification of discharged cultures was carried out by morphological, tinctorial and biochemical properties. Smears were taken from evolved colonies and coloured by Gram ’s Method. Pure growth was accumulated on the conforming medium in suitable atmosphere, then identified on the microbiologic evaluator «Vitek-II Compact» with application of identification cards «Vitek 2 GN», «Vitek 2 GP», «Vitek NH», «Vitek 2 YST» and «Vitek 2 ANC» (Bio-Merieux).

The biological preparation "Yagel" has been developed in the Institute of biological problems of cryolite of the Siberian Branch of the Russian Academy of Science (Yakutsk) and has the certificate of the state registration in Federal Agency of control in sphere of consumers’rights protection of the Russian Federation №77.99.23.3. У.3522.5.08 on 5/4/2008; technical specifications 9219-002-36971185-08; sanitary-and-epidemiologic conclusion of Federal Agency of control in sphere of consumers’rights protection of the Russian Federation №77.99.03.003. Т.000928.05.08 on5/4/2008; the certificate of the state registration, customs union of Byelorussia, Republic Kazakhstan and the Russian Federation №RU.77.99.11.003. Е.051236.11.11 on 11/17/2011; the Russian Federation patent №2006100978 on 8/1/2007. It is made of frond lichens extract of Cladina family and contains: basic active materials – amino - β-oligosaccharides, formed from amino - β-polysaccharides processing by water in Carbon dioxide medium in the state of supercritical liquid. It contains also a complex of substances of antioxidant actions: orselic, lecronic, griphoric, xiatic acids and quinones; vitamin B_{12}, folic acid; natural antibiotics – usnic acids and their derivatives. Preparation of suspension on the basis of "Yagel" was made by method of refrigerator centrifuging on device "К-70Д" (Germany) at rotating speed of 3500 turns a minute and temperature 70+2ºС within 40-45 minutes.

RESULTS AND DISCUSSIONS

The analysis of the received data testifiedgingivitis prevalence in the examined groups of children where the tendency of increase of inflammatory processes frequencyin marginal gum was defined. So, 7-year-old children had index 41.23±0.63 % and in teenagers' group of 17 years old – 85.57±0.15 %. Thus the mean index of gingivitis prevalence among children living in the Central Yakutia was 63.08±0.18%. It is necessary to emphasize that intensity of inflammatory process byPMA index among children from 7 till 12 years old was characterized as mild case and from 13 till 17 years old – moderate severity level. Meanwhile the arithmetic-mean index is interpreted as a mean level of marginal gum inflammation in the examined groups of schoolchildren. But at the same time, 6.43±0.45 % had localized chronic periodontitis of mild severity level.

Gingivitis prevalence among children of school age and also unsolved problems of its treatment and prevention dictate necessity of constant search of effective methods and medications. We've researched for the first time antimicrobial action of "Yagel" in clinical stomatology. The received results of microbiologic research characterized some peculiarities of antimicrobial action of "Yagel" to parodentium pathogenic microflora in case of gingivitis (tab.1). At the beginning of the research the definition of the minimum inhibiting concentration of this preparation has been made. The minimum concentration of inhibiting effect on microorganisms, taking part in the development of inflammatory process of marginal gum has been revealed. So, concentration of "Yagel" which renders an inhibiting effect onCandidaalbicans10^3 and Candidadubliniensis$10^3$was 0.07 mg/ml whereas in group of Candidadubliniensis104 it was 2 times more and was 0.15 mg/ml. Meanwhile minimum inhibiting concentration of "Yagel" for Candida infection was at level of 0.31 mg/ml.

It is necessary to note, concentration of "Yagel" action for Neisseriasicca10^7 was equal to 0.6 mg/ml and Neisseriasicca10^6 – 0.31 mg/ml. Thus mean concentration, Neisseria growth-retarding was 0.5 mg/ml. But at the same time the minimum inhibiting concentration and mean index of this preparation was at the level of 0.07 mg/ml. at various levels of colony-forming units of streptococci (Streptococcusoralis10^5, Streptococcusmutans10^6)

Thecharacteristic of antibacterial action of "Yagel" to parodentium pathogenic microflora in case of gingivitis

Species of microorganisms	Minimum inhibiting concentration (mg/ml)	Minimum bactericidal concentration (mg/ml)
Candida albicans10^3	0.07	0.15
Candida dubliniensis10^3	0.07	0.15
Candida dubliniensis10^4	0.15	0.3
Mean concentration for Candida fungus	0.31	0.66
Neisseria sicca 10^7	0.6	1.2
Neisseria sicca 10^6	0.31	0.6
Mean concentration for Neisseria	0.5	1
Streptococcusoralis 10^5	0.07	0.15
Streptococcusmutans 10^6	0.07	0.15
Mean concentration for Streptococcus	0.07	0.15

It is necessary to notice that the revealed minimum inhibiting concentration of "Yagel" on conditional-pathogenic microflora in gingivitis promoted us to further researches on its minimum bactericidal concentration. Some features which characterize its variability have been defined. So, minimum bactericidal concentration was 0.15 mg/ml at various quantity indicators of Candidaalbicans10^3 and Candidadubliniensis10^3 whereas Candidadubliniensis10^4 concentration raised in 2 times and was 0.3 mg/ml.

The analysis and assessment also promoted definition of mean bactericidal concentration of "Yagel" for Candidainfection2 times more, than minimum inhibiting concentration and was 0.66 mg/ml.

It is necessary to notice that Neisseriasicca10^6 minimum bactericidal concentration to gram-negative microorganisms was rare faction of 0.6 mg/ml. But at the same time in quantitative values Neisseriasicca10^7index raised in 2 times and reached level of 1.2 mg/ml. Mean bactericidal concentration of "Yagel" for Neisseria was 1 mg/ml. To such gram-positive microorganisms Streptococcusoralis$10^5$and Streptococcusmutans10^6 Minimum bactericidal concentration was 0,15mg/ml. The similar index also was defined at mean concentration for Streptococcus.

CONCLUSION

Our first research of antimicrobial action of "Yagel" to gram-positive and gram-negative microflora and also to Candida infection in case of gingivitis has characterized its efficacy. In this connection it could be applied in clinical dentistry for the treatment-and-prophylactic help of pathological processes of parodontium tissues of inflammatory-destructive character as alternative medication. The high level of gingivitis among various age-groups of school children and the received results of the minimum inhibiting concentration and minimum bactericidal concentration of "Yagel" in their practical application will have positive effect in prevention and treatment of inflammatory processes of marginal gum.

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