

## CHARACTERISTICS OF HEMOLYTIC STREPTOCOCCI, ISOLATED FROM THE NASOPHARYNX OF HEALTHY AND AFFECTED CHILDREN IN VARNA AND DISTRICT OF VARNA

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After the adoption of the new serological methods for group differentiation of streptococci, studies were undertaken for the determination of the streptococcal group appartenance, having an essential bearing on human pathology. Gardner (6) determined the serological properties of the hemolytic streptococci in a variety of infectious diseases in humans, employing the Landsfield classification. On substantial material, the same author established that the great majority of the strains studied belong to group A. Cultures of this particular group have been isolated mainly among patients with acute forms of tonsillitis and rheumatism, scarlet fever, otitis and erysipelas. The group A hemolytic streptococci findings correspond to severely affected cases.

Monaux and Müller (cited by 6) make reference to sufficiently great number of authors who investigated the upper respiratory tract microflora. Very often the presence was stressed of hemolytic and greeny streptococci.

Pillot, Garrison and Takper (cited by 6) studied the microflora of the nasopharynx in 28 children, aged from 2 to 6 years. They found hemolytic streptococci in 83% of the tonsils.

Helmhall (cited by 6) investigated nasopharyngeal secretion from 18 children, aged 2—14 years over a period of 6 months. Of the 486 strains isolated, 44% were hemolytic streptococci and 56% — non-hemolytic. Investigations for the differentiation of streptococci according to serological signs in this country have been performed by Donchev, Grigorova, Stoyanova, Chilingirov (1, 2, 3, 4) and others.

The purpose of the present work is to investigate the group appartenance of the streptococci, isolated from the nasopharynx of children affected with rheumatism, catarrhs of the upper airways as well as from healthy children.

### Material and Method

A total of 232 strains of hemolytic streptococci were investigated, isolated as follows: 147 — from rheumatic children, 27 — from children with catarrhs of the upper airways and 58 — from healthy children. The material for study was obtained with sterile tampon (plug) and immediately thereafter grown on blood agar. The isolated in pure culture streptococcus underwent biochemical examination after the universally accepted biochemical indices. The group appartenance of the streptococci was determined by means of reaction precipitation. The sera necessary for the latter were personally prepared after the method of Rantz-Randall (5). Some of the isolated strains

were tested for sensibility and resistance to the following antibiotics: penicillin — 200 U/ml, streptomycin, biomycin, erythran, chlornitromycin, resistomycin, rovamycin and tetracycline — 1000 gamma/ml. The streptococci, displaying a depression zone up to 10 mm were accepted as resistant, with depression zone ranging from 11 to 20 mm — slightly sensible, with depression zone ranging from 21 to 30 mm — average sensibility and with depression zone beyond 30 mm — strong sensibility.

### Results

The results of the investigations performed for establishing the group appartenance of the streptococci, isolated from children affected with rheumatism, are illustrated in table 1:

Table 1

	Group Precipitation serum											
	A	B	C	D	E	F	G	K	L	M	N	Other groups
Number	15	13	16	9	14	16	12	14	11	8	1	18
%	10.2	8.84	10.88	6.12	9.52	10.88	8.16	9.52	7.48	5.44	0.68	12.24

The table shows that the highest number of isolated streptococci is entitled to those belonging to the group C and F (16—10.88%), next ranking those of group A (15 — 10.2%). A rather high percentual goes also to the streptococci of groups E and K (14 — 9.52%). The streptococci of the remaining groups are arranged in the following order: group B(8.84%), G (8.26%), L (7.48%), D (6.12%), M (5.44%) and N (0.68%).

Table 2 presents the group appartenance of the streptococci, isolated from children with upper airway catarrhs:

Table

	Group Precipitation Serum											
	A	B	C	D	E	F	G	K	L	M	N	Other group
Number	7	1	4	1	1	4	2	5	—	2	—	—
%	25.92	3.7	14.81	3.7	3.7	14.81	7.4	18.51	—	7.4	—	—

It is evident from the table 1 that among the streptococci, isolated from children with catarrhs of the upper respiratory tracts, those of the group A prevail (7—25.92%). Streptococci encountered in high percentuals are

the following: group K (5—18.51), C and F (4—14.81%). The remaining streptococci are encountered in substantially lower percentages, namely: group G and M (2—7.4%), followed by groups B, E and D (1—3.7%). Streptococci of groups L and N were not isolated with this group of children.

The group affiliation of the streptococci, isolated from healthy children is illustrated in table 3:

Table 3

	Group Precipitation Serum											Other groups
	A	B	C	D	E	F	G	K	L	M	N	
Number	2	10	9	4	8	12	—	5	2	1	—	5
%	3.44	17.24	15.51	6.89	13.79	20.68	—	8.62	3.44	1.72	—	8.62

The data in table 3 demonstrate that the highest percentage streptococci, isolated from healthy children goes to those of group F (12 — 20.68%). High percentages are also recorded in the streptococci of groups B (10—17.24%), C (9—15.51%) and E (8—13.79%).

The resistance and sensibility to beta-hemolytic streptococci are presented in table 4, which shows that the highest percentage resistant strains are observed with streptomycin (85%), next ranking tetracycline (25%). As regards the remaining antibiotics, the streptococci display a resistance in much lower percentuals: towards resistomycin — 15%, biomyacin — 10% and penicillin — 5%. No resistant strains were established whatsoever with the other antibiotics employed. A weakly manifested sensibility was observed in all the antibiotics used, except for erythran. The highest percentage is noted with resistomycin (75%), biomyacin (50%) and with tetracycline (45%). With the other antibiotics it displays lower percentages, showing weakest manifestation with streptomycin and rovamycin (15%). Average sensibility is manifested in rather low percentage with all antibiotics. The highest percentage is recorded with chlornitromycin (35%), whilst with streptomycin sensibility was nonexistent. The largest number of strongly pronounced sensible strains is observed with erythran (90%), followed by rovamycin (60%). The lowest number is recorded with the resistomycin (5%), whilst with the streptomycin such strains are not at all met with.

The resistance and sensibility of the alpha-hemolytic streptococci are presented in table 5.

It shows that similar to the beta-hemolytic streptococci, the highest percentage of resistant strains is established with the streptomycin, although in a lower percentage (52.67%). Towards the other antibiotics the resistance is weakly manifested, being the weakest with erythran and chlornitromycin (3.05%). A weakly pronounced sensibility is likewise manifested. The highest percentual is observed with the resistomycin (8.09%), and the lowest — with the erythran (4.58%). The highest percentage average manifested sensibility is recorded with the erythran (63.35%), next ranking

Table 4

Antibiotics	Penicillin		Streptomycin		Blomycin		Erythran				
Sensitivity of streptococcal strains Percentage	-	+	+	+	+	+	-	+	+	+	+
	1	7	5	7	17	3	2	10	5	3	18
	5	35	25	35	85	15	10	50	25	15	90
Antibiotics	Chlornitromycin		Resistomycin		Rovamycin		Tetracycline				
Sensitivity of streptococcal strains Percentage	-	+	+	+	+	+	-	+	+	+	+
	5	7	35	40	3	15	3	5	12	3	15
	25	25	35	40	15	75	15	25	60	45	15

Table 5

Antibiotics	Penicillin		Streptomycin		Blomycin		Erythran						
Sensitivity of streptococcal strains Percentage	-	+	+	+	-	+	-	+	+	+			
	16	36	39	40	69	47	17	43	28	4	6	83	38
	12.25	27.48	29.47	30.53	52.67	35.87	12.97	32.82	21.37	3.05	4.57	63.35	29
Antibiotics	Chlornitromycin		Resistomycin		Rovamycin		Tetracycline						
Sensitivity of streptococcal strains Percentage	-	+	+	+	-	+	-	+	+	+	+	+	
	4	24	61	42	30	63	17	50	38	16	38	48	29
	3.05	18.32	46.56	32.05	22.9	48.09	12.97	38.16	44.27	12.21	29	36.64	22.13

the chlornitromycin (46.56%) and the lowest — with streptomycin (11.45%). The greatest number highly sensible strains is noted in rovamycin (44.27%), followed by those in chlornitromycin (32.06%). On the whole, the strongly sensitive strains are scarcely manifested in low percentages, the lowest percentage recorded being 12.97 — with the resistomycin. The streptomycin was the only antibiotic not exhibiting this type of strains. The listed below inferences were reached on the basis of the investigations performed:

1) The highest number of streptococci, isolated from rheumatic children, belongs to groups C and F.

2) The prevailing number of streptococci, isolated from children with upper respiratory tract catarrhs, is entitled to group A.

3) The streptococci, isolated from healthy children, are mainly from groups B and C.

4) The beta-hemolytic streptococci display the highest percentual resistance to streptomycin.

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#### ХАРАКТЕРИСТИКА ГЕМОЛИТИЧЕСКИХ СТРЕПТОКОККОВ, ИЗОЛИРОВАННЫХ ИЗ НОСОГЛОТКИ ЗДОРОВЫХ И БОЛЬНЫХ ДЕТЕЙ В ВАРНЕ И ВАРНЕНСКОМ ОКРУГЕ

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#### РЕЗЮМЕ

Исследована групповая принадлежность стрептококков, изолированных из носоглотки детей, больных катармами верхних дыхательных путей, а также и здоровых. Проведенные исследования дают возможность сделать следующие выводы:

1. Самое большое число стрептококков, изолированных от больных ревматизмом детей, принадлежат к группам С и F.

2. Преобладающее число стрептококков, изолированных от детей, болеющих катармами верхних дыхательных путей, приходится на группу А.

3. Стрептококки, изолированные от здоровых детей, преимущественно групп В и С.

4. Бета-гемолитические стрептококки в самом большом проценте случаев являются устойчивыми к стрептомицину.