

ANTIMICROBIAL SUSCEPTIBILITY OF CLINICALLY SIGNIFICANT ANAEROBIC BACTERIA IN SLOVENIA, 2014



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BACKGROUND

Routine antimicrobial susceptibility testing (AST) of anaerobic bacteria is rarely performed in microbiological laboratory despite the fact that anaerobes are well established pathogens responsible for severe human infections. Recent advances in anaerobic culture processing with simplified identification with MALDI-TOF and AST standardization have narrowed the gap between aerobic and anaerobic bacteriology. The aim of the study was to collect routine AST data and compare them with available results from previous surveillance studies.

METHODS

Routine AST results for anaerobic bacteria isolated in 2014 from various specimen sources at a central Slovenian microbiological laboratory were analysed. MALDI-TOF was used for species identification. Minimal inhibitory concentration (MIC) for 5 antimicrobial agents with activity against anaerobes (i.e. penicillin, co-amoxiclav, imipenem, clindamycin and metronidazole) was determined with gradient diffusion test using supplemented Brucella agar. The EUCAST clinical breakpoints were used for the interpretation. Anaerobic atmosphere was created with gas exchange Anoxomat system in jars.

RESULTS

A total of 2.600 non-repetitive clinically important anaerobic isolates were analysed. Majority were from wound specimens, 43.8% (n=1138), followed by abdominal, urogenital and diabetic foot infections with 20.3% (n=528), 6.5% (n=168) and 5.2% (n=136), respectively. Isolates from positive blood cultures represented 3.1% (n=81). Anaerobic Gram-negative bacilli (AGNB) represented 56.5% (n=1470) of isolates; *Bacteroides fragilis* group, *Prevotella* spp. and *Fusobacterium* spp. isolates were present in 33.5% (n=872), 15.2% (n=395) and 7.3% (n=191), respectively. *B. fragilis* was single most predominant species with 11.7% (n=303) isolates. Gram-positive anaerobic cocci (GPAC) represented 23.1% (n=601) of isolates; *Finnegoldia magna*, *Peptoniphilus* spp. and *Anaerococcus* spp. were present in 7.7% (n=200), 7.3% (n=189) and 6.2% (n=160), respectively. Finally, Gram-positive anaerobic bacilli (GPAB) represented 17.7% (n=459) of isolates; *Propionibacterium* spp. 6.8% (n=177), *Clostridium* spp. 6.5% (n=168) and *Actinomyces* spp. 4.4% (n=114). AST results are presented in table 1.

CONCLUSION

Metronidazole, imipenem and co-amoxiclav retained excellent overall activity against anaerobic bacteria without intrinsic resistance. Penicillin is active mainly against Gram-positive anaerobes and fusobacteria. Overall clindamycin resistance of 23.7% and its wide distribution among all groups of anaerobes warrants caution when used as an empiric treatment for anaerobic and mixed infections. Clindamycin resistance of *B. fragilis* group isolates in Slovenia rose from 12% in 2003 to 25% in 2014.

Table 1: Antimicrobial susceptibility of most common clinically significant anaerobic isolates in Slovenia, 2014.

Bacteria (No.)/Antibiotics	Number	Clindamycin MIC (mg/L)				Penicillin MIC (mg/L)				Imipenem MIC (mg/L)				Amoxicillin-clavulanic acid MIC (mg/L)				Metronidazole MIC (mg/L)			
		Range	MIC50	MIC90	%R	Range	MIC50	MIC90	%R	Range	MIC50	MIC90	%R	Range	MIC50	MIC90	%R	Range	MIC50	MIC90	%R
<i>Bacteroides fragilis</i> group	872	0.016-256	1	256	25.4	0.016-256	12	256	96.9	0.004-32	0.125	0.5	0.3	0.016-256	0.25	2	2.8	0.016-6	0.25	0.75	0
<i>B. fragilis</i>	303	0.016-256	0.5	256	19.4	1.5-256	12	256	100	0.023-32	0.064	0.25	0.7	0.016-256	0.094	1.5	1.6	0.032-6	0.25	0.5	0
<i>B. thetaiotaomicron</i>	156	0.016-256	3	256	28.8	0.5-256	24	256	98.7	0.032-2	0.19	0.38	0	0.032-256	0.25	3	3.2	0.047-1.5	0.25	0.75	0
<i>B. ovatus</i>	104	0.016-256	2	256	30	0.5-256	12	256	99	0.016-3	0.125	0.38	0	0.016-256	0.38	4	3.8	0.047-2	0.25	0.75	0
<i>B. vulgatus</i>	101	0.016-256	0.125	256	22.8	0.25-256	32	256	91.1	0.004-2	0.19	0.75	0	0.016-96	0.19	1.5	2	0.016-2	0.25	0.75	0
<i>B. uniformis</i>	81	0.016-256	1	256	23.5	0.016-256	8	256	92	0.016-1.5	0.125	0.38	0	0.016-12	0.19	1.5	1.2	0.016-4	0.25	1	0
<i>Parabacteroides</i> spp.	58	0.016-256	2	256	42.9	0.016-256	256	256	94.6	0.004-3	0.5	1.5	0	0.016-256	1.5	8	8.9	0.047-4	0.38	1.5	0
<i>Prevotella</i> spp.	395	0.016-256	0.023	256	33.2	0.016-256	1	8	52.2	0.002-38	0.032	0.064	0	0.016-6	0.016	0.125	0	0.016-6	0.38	1	0
<i>P. bivia</i>	110	0.016-256	0.032	256	35.5	0.032-32	1.5	8	75.5	0.006-0.19	0.047	0.094	0	0.016-6	0.016	0.25	0	0.064-4	0.75	2	0
<i>P. melaninogenica</i>	55	0.016-256	0.023	256	21.8	0.016-64	1.5	8	61.8	0.002-0.094	0.032	0.064	0	0.016-75	0.016	0.064	0	0.016-1	0.125	0.75	0
<i>P. buccae</i>	32	0.016-256	0.016	256	25	0.016-256	0.064	24	43.8	0.002-0.19	0.047	0.094	0	0.016-1.5	0.016	0.38	0	0.016-2	0.25	0.5	0
<i>Porphyromonas</i> spp.	12	0.016-256	0.016	256	41.7	0.016-256	0.016	0.75	16.7	0.002-0.094	0.016	0.064	0	0.016-0.25	0.016	0.064	0	0.016-1	0.023	0.5	0
<i>Fusobacterium</i> spp.	191	0.016-256	0.016	0.064	3.7	0.004-256	0.016	0.047	2.6	0.002-1.5	0.016	0.047	0	0.016-256	0.016	0.032	1	0.016-3	0.16	0.094	0
<i>Veillonella</i> spp.	70	0.016-256	0.064	0.19	2.8	0.016-256	0.75	4	50.7	0.002-1.5	0.125	0.5	0	0.016-16	0.19	2	1.4	0.047-4	0.75	2	0
Gram positive anaerobic cocci (GPAC)	601	0.016-256	0.38	256	30.1	0.016-256	0.032	0.094	2.5	0.002-1.5	0.023	0.064	0	0.032-32	0.016	0.125	0.2	0.016-4	0.19	0.75	0
<i>F. magna</i>	201	0.016-256	1.5	256	38.8	0.016-2	0.047	0.094	1.5	0.002-0.19	0.047	0.094	0	0.016-1.5	0.023	0.19	0	0.016-4	0.125	0.38	0
<i>P. harei</i>	167	0.016-256	0.38	256	31.1	0.016-4	0.023	0.094	1.8	0.002-1	0.016	0.032	0	0.016-3	0.016	0.064	0	0.016-2	0.5	1	0
<i>Anaerococcus</i> spp.	160	0.016-256	0.064	256	22.5	0.016-256	0.016	0.064	0.6	0.002-0.75	0.016	0.064	0	0.016-0.75	0.016	0.047	0	0.016-4	0.125	0.5	0
<i>Clostridium</i> spp.	168	0.016-256	0.19	256	19.5	0.016-256	0.094	1.5	12.4	0.002-256	0.125	1	1.2	0.016-4	0.032	0.5	0	0.016-8	0.25	1	0
<i>C. perfringens</i>	56	0.016-256	1	6	10.7	0.016-1	0.064	0.125	1.8	0.023-0.38	0.094	0.125	0	0.016-1	0.016	0.032	0	0.023-3	0.5	1	0
<i>C. innocuum</i>	25	0.013-256	0.125	256	24	0.016-8	0.25	1.5	12	0.008-4	1	2	0	0.016-1	0.25	0.5	0	0.016-8	0.19	0.5	0
<i>Actinomyces</i> spp.	114	0.016-256	0.094	256	15.8	0.016-1.5	0.047	0.19	1.8	0.004-0.38	0.064	0.125	0	0.016-1.5	0.016	0.19	0	0.125-256	256	256	98.2
<i>Propionibacterium</i> spp.	177	0.016-256	0.047	1	9.6	0.016-48	0.016	0.047	0.6	0.002-0.125	0.012	0.047	0	0.016-0.38	0.016	0.064	0	256	256	256	100