ETIOLOGY AND ANTIMICROBIAL RESISTANCE OF PATHOGENS OF SKIN AND SOFT TISSUE INFECTIONS IN OUTPATIENTS: RESULTS OF FIRST PROSPECTIVE STUDY IN RUSSIA

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Introduction

Bacterial skin and soft tissue infections (SSTI) are one of the most common presentations in outpatients in dermatological and surgical practice. Etiological diagnosis of these infections is often uncertain since bacteriological tests are rarely done in routine practice. The treatment of SSTI is usually empiric, at least initially. However there are no currently available reliable data on antimicrobial resistance of causative pathogens in Russia. The aim of this study was to investigate the epidemiology and antimicrobial susceptibility of the most common bacterial pathogens in community-acquired SSTI.

Methods

A total of 200 adult immunocompetent patients (143 men, 57 women) from Smolensk region (Russia) with SSTI aged from 17 to 81 (30.1±14.7) were enrolled in the study. Deep swabs or wound biopsy were performed in all patients before the start of antibacterial therapy. Identification was done by standard biochemical tests. The susceptibility testing was done by agar-dilution method using Mueller-Hinton agar (Becton Dickinson, USA). The interpretation of the results was performed according to the NCCLS guidelines (2004), except for fusidic acid, lincomycin, mupirocin and spiramycin (SFM, 2003). *Staphylococcus aureus* ATCC®29213 and *Streptococcus pyogenes* ATCC® 49619 strains were used for quality control.

Results and discussion

In 181 (90.5%) patients 241 bacterial strains were isolated. The most frequently isolated pathogens were *S. aureus* (61.4%) and *S. pyogenes* (35.7%); among others - *Acinetobacter baumannii* (1.2%), *Pseudomonas aeruginosa* (0.8%), *Enterobacter cloacae* (0.4%) and *Enterococcus faecalis* (0.4%). In 121 (66.9%) patients with positive cultures single bacterial pathogens were found, in 60 (33.1%) - mixtures of various species, mainly *S. aureus* and *S. pyogenes* (90%).

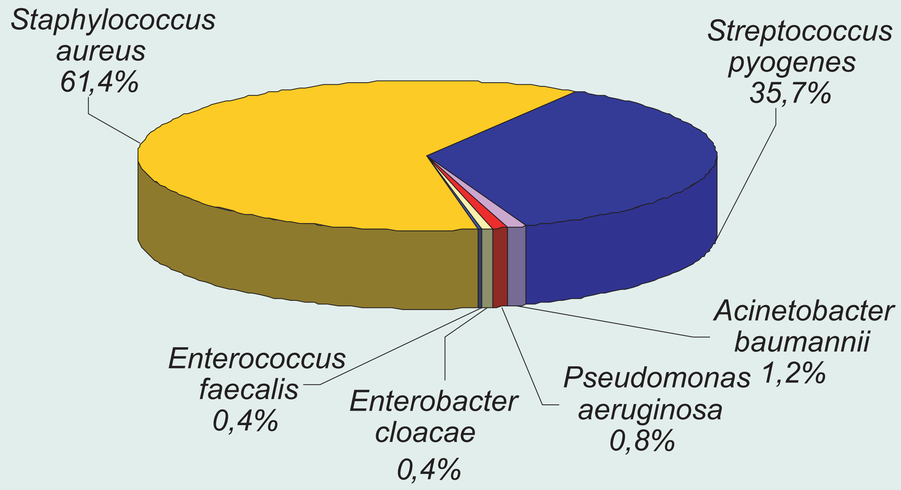

Fig. 1. Etiology of SSTI in outpatients

Susceptibility patterns of *S. aureus* and *S. pyogenes* are presented in tables 1 and 2, respectively.

Non-susceptibility (intermediate resistance and resistance) rates for *S. aureus* were: chloramphenicol (33.1%), erythromycin (14.5%), tetracycline (12.4%), clindamycin (1.4%), ciprofloxacin (0.7%). No resistance to oxacillin, fusidic acid, mupirocin, levofloxacin, co-trimoxazole and vancomycin was found. Non-susceptibility rates for *S. pyogenes* were: tetracycline (72.6%), chloramphenicol (19%), erythromycin (6%). No resistance to beta-lactams, quinolones, clindamycin and mupirocin was found.

Table 1 Results of susceptibility testing of *S. aureus* (n=145)

Antimicrobial	S (%)	I (%)	R (%)	MIC50/MIC90	MIC ranges
Chloramphenicol	66.9	0	33.1	8/64	2-128
Ciprofloxacin	99.3	0.7	0	0.5/1	0.25-2
Clindamycin	98.6	0	1.4	0.06/0.06	0.03-0.125
Co-trimoxazole	100	0	0	0.06/0.06	0.03-0.125
Erythromycin	85.5	0	14.5	0.25/512	0.25-512
Fusidic acid	100	0	0	0.06/0.125	0.06-0.25
Gentamicin	100	0	0	0.25/0.5	0.25-0.5
Levofloxacin	100	0	0	0.25/0.25	0.125-0.5
Lincomycin	97.2	0	2.8	1/1	0.5-512
Linezolid	100	0	0	1/2	1-2
Moxifloxacin	100	0	0	0.03/0.06	0.016-0.125
Mupirocin	100	0	0	0.25/0.25	0.125-0.25
Oxacillin	100	0	0	0.5/1	0.125-2
Rifampicin	100	0	0	0.016/0.016	0.016-1
Tetracycline	87.6	0	12.4	0.25/32	0.25-64
Vancomycin	100	0	0	1/1	0.5-1

Table 2 Results of susceptibility testing of *S. pyogenes* (n=84)

Antimicrobial	S (%)	I (%)	R (%)	MIC50/MIC90	MIC ranges
Azithromycin	92.9	3.6	3.6	0.03/0.125	0.03-4
Ceftriaxone	100	0	0	0.03/0.03	0.02-0.03
Chloramphenicol	81	0	19	2/16	1-16
Ciprofloxacin	100	0	0	0.25/0.5	0.25-1
Clarithromycin	96.4	0	3.6	0.03/0.03	0.03-4
Clindamycin	100	0	0	0.03/0.03	0.03-0.06
Co-trimoxazole	100	0	0	0.06/0.125	0.06-0.125
Erythromycin	94	2.4	3.6	0.03/0.06	0.03-4
Fusidic acid	58.3	41.7	0	2/4	2-8
Levofloxacin	100	0	0	0.5/0.5	0.25-1
Lincomycin	100	0	0	0.06/0.06	0.03-0.125
Linezolid	100	0	0	1/2	0.125-2
Moxifloxacin	100	0	0	0.125/0.25	0.06-0.25
Mupirocin	100	0	0	0.125/0.125	0.06-0.5
Penicillin G	100	0	0	0.01/0.01	0.01-0.02
Spiramycin	100	0	0	0.125/0.25	0.06-0.25
Telithromycin	100	0	0	0.01/0.02	1.95×10^{-3}-0.25
Tetracycline	27.4	0	72.6	32/32	0.125-35

Conclusions

- Not surprisingly, the main causative agents of community-acquired SSTI in the study were *S. aureus* and *S. pyogenes*.
- Community-acquired methicillin-resistant *S. aureus* is still not a problem in Smolensk region.
- *S. aureus* as well as *S. pyogenes* showed relatively high resistance to antimicrobials formerly used for therapy of SSTI, such as chloramphenicol (33.1% and 19%, respectively), tetracycline (12.4% and 72.6%) and erythromycin (14.5% and 6%).
- Beta-lactams, newer quinolones, mupirocin and fusidic acid were highly active against tested strains and can be considered for the treatment of SSTI.