Antibiotic resistance of *Campylobacter jejuni* isolated from diarrhoeal outpatients

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BACKGROUND

- The Gram-negative rod-shaped *Campylobacter jejuni* is the leading cause of bacterial gastroenteritis among human beings worldwide[1].
- In humans, most enteric infections caused by *Campylobacter spp*. are considered self-limited and generally do not require antimicrobial treatment[2].
- However, antimicrobial therapy should be carried out in the event of severe illness, lack of clinical improvement or immunosuppression[3].

OBJECTIVES

- The aim of this study was to determine the antimicrobial susceptibility of *Campylobacter jejuni* isolated from stool specimens of symptomatic outpatients from the Rhine-Ruhr metropolitan region in North Rhine-Westphalia.

MATERIAL & METHODS

- A total of 433 *Campylobacter spp*. were isolated from stool samples from January to December 2020.
- Identification of the isolates was performed by conventional methods (Thermo Scientific™ CCDA Selective Medium, Gram stain, Catalase and Oxidase Test BioMérieux, Thermo Scientific™ Remel™ Hippurate Disc).
- Antimicrobial susceptibility testing of the isolates was determined by disc-diffusion technique. 0.5 McFarland turbidity standard equivalent bacteria suspension was prepared and inoculated on Müller-Hinton agar supplemented with 5 % horse blood and 20 mg/l β-NAD (MH-F Thermo Scientific™) incubated for 24-48 h at 42 °C in a microaerophilic atmosphere after application of antimicrobial discs. The following antimicrobials were used with their respective concentrations: ciprofloxacin (BD Sensi-Disc™ CIP 5 µg), erythromycin (BD Sensi-Disc™ ERY, 15 µg) and tetracycline (BD Sensi-Disc™ TET, 30 µg). Zones of inhibition around the discs were measured and interpreted according to EUCAST interpretive criteria. *Campylobacter jejuni* (ATCC 33560) was used for quality control.
- The patient cohort was differentiated by sex (male and female) and age (≤ 14, 15 - 29, 30 - 44, 45 - 59, 60 - 74, 75 - 89 and ≥ 90 years).
- Additionally, medical specialties of the senders were taken into account. Demographic and patients data were extracted from the Laboratory Information System MOLIS (version 4.40) and statistics program HyBASE® and included in the analysis.

RESULTS

- Considering a single *Campylobacter* isolate per patient, 258 (60 % of all isolates) *C. jejuni* and 175 (40 % of all isolates) *Campylobacter spp*. (not *jejuni*) isolates were identified from stool specimens (**Fig. 1**). The percentage of consistency of the stool samples of the *C. jejuni* isolates were as follows: 42.2 % loose-stool, 28.3 % watery-stool, 28.3 % soft/formed-stool, and 1.2 % blood in stool specimens (**Fig. 2**).

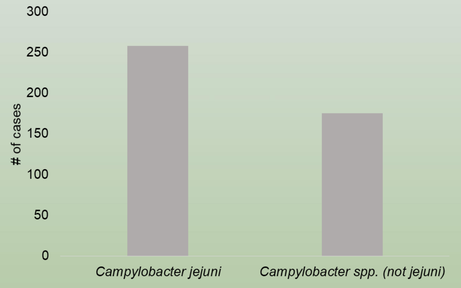

Fig. 1: Distribution of cases between *C. jejuni* and *C. spp.* (not *jejuni*).

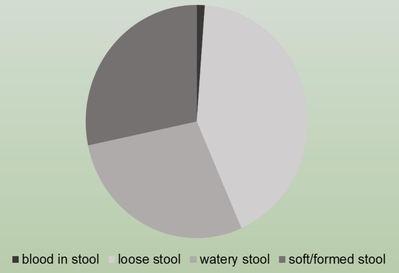

Fig. 2: Consistency of *C. jejuni*-positive stool samples.

- The highest percentage of *C. jejuni* was found in women (52.7 %; 136/258) (**Fig. 3**) and in the age group 45-59 years (29.1 %; 75/248) (**Fig. 4**). From 242 of 258 isolates (93.7 %), antibiograms were performed. The remaining 16 strains (6.2 %) could not be re-cultivated.

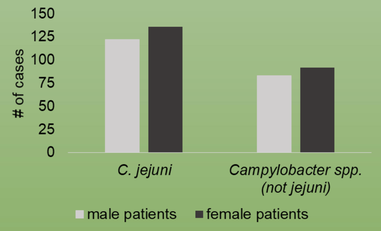

Fig. 3: Distribution of *C. jejuni* and *C. spp*. (not *jejuni*) between male and female patients.

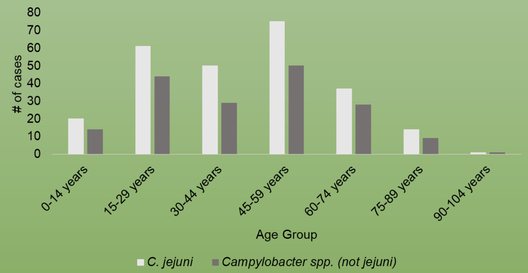

Fig. 4: Cases of *C. jejuni* and *C. spp*. (not *jejuni*) in different age groups.

RESULTS

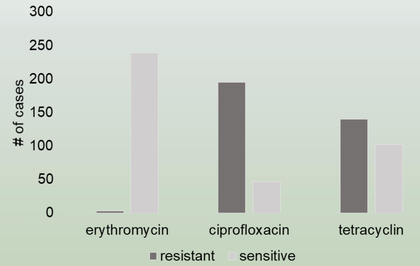

Fig. 5: Antibiotic resistances detected in *C. jejuni* isolates.

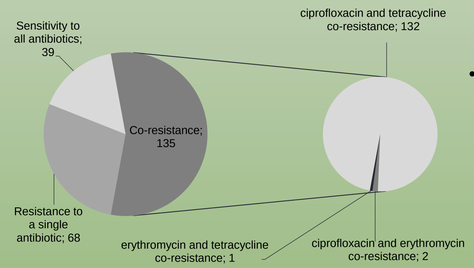

Fig. 6: Frequency of single antibiotic resistances and co-resistances in *C. jejuni* isolates.

- Among *C. jejuni* isolates, 195 (80.6 %) were resistant to ciprofloxacin, 140 (57.8 %) to tetracycline and 3 (1.2 %) to erythromycin (**Fig. 5**).
- The vast majority of the tested *C. jejuni* strains were co-resistant (**Fig. 6**).
- 135 (55.7 %) *C. jejuni* isolates tested in 2020 were resistant to at least two antimicrobials; 68 (28.1 %) *C. jejuni* isolates were resistant to a single antibiotic and 39 (16.1 %) *C. jejuni* isolates were sensitive to three antibiotics.
- The highest percentage of co-resistance was the combination of ciprofloxacin plus tetracycline (54.5 %; 132/242) and with a lower percentage ciprofloxacin plus erythromycin (0.82 %; 2/242) and erythromycin plus tetracycline (0.41 %; 1/242).
- The stool specimens with *C. jejuni* isolates were collected from the following medical specialties: 58.1 % general medicine, 33 % internal medicine, 8.1 % paediatrics and 0.8 % other medical specialties.

SUMMARY / CONCLUSIONS

In our area, the highest percentage of patients infected by *C. jejuni* were found in female outpatients in adulthood from the general medicine and internal medicine consultation. *C. jejuni* presented high rates of resistance to ciprofloxacin and tetracycline, that are in line with findings of the Robert Koch-Institute[4]. These data are similar to other countries and most likely correlated to the use of these drugs in animal husbandry[4,5]. In the case of ciprofloxacin (fluorchinolones), it is a first-line antibiotic in the treatment of acute bacterial gastroenteritis in cases without clear microbiological identification[6,7]. Treatment of *C. jejuni* infections with erythromycin (macrolides) is discouraged because of its spectrum of side effects, instead azithromycin (macrolides) is the recommended treatment option for *C. jejuni* infections[8].

References

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