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Epidemiology and Antimicrobial resistance in Campylobacter

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Abstract: *50 Campylobacter spp. were isolated from 759 samples, giving an overall prevalence of 6.58%. Individually, the highest prevalence rate of 13.54% was recorded in poultry meat, followed by 7.6% in chevon, 0.78% in pork and 2% from human stool samples. None of the isolates were recovered from beef and fish meat samples. Most of the obtained isolates were classified as C. jejuni (35 strains, 70%), whereas C. coli was identified in 15 (30%) samples, indicating that the C. jejuni was the most commonly found species. Of fifty Campylobacter isolates, 20 Campylobacter jejuni and 10 Campylobacter coli were examined for their sensitivity to 8 antibiotics. All of the C. jejuni and C. coli isolates were resistant to Cephalothin (100%) and sensitive to Gentamicin and Erythromycin (100%). While 80%, 50% and 40% resistance was observed against Suphamethoxazole, Ampicillin and Ciprofloxacin respectively. Among C. coli, 70%, 80% and 50% sensitivity was observed against Ciprofloxacin, Nalidixic acid and Gentamicin respectively and 50% isolates were resistant to Ampicillin.*

I. Introduction

Campylobacters cause serious complications related to acute bacterial enteric disease in humans throughout the world**.** The most important Campylobacter species associated with human illness are campylobacter jejuni and Campylobacter coli (Wesley et al., 2000). More recently, concern regarding the prevalence of campylobacteriosis has increased because of the frequent isolation of antimicrobial-resistant strains from humans and animals. High prevalence and increasing resistance to antimicrobial drugs has been documented in human and animal strains of Campylobacter (Padungton and Kaneene, 2003). This is particularly worrying where fluoroquinolone and macrolide are concerned, since these molecules are used for human treatment of campylobacteriosis (Skirrow and Blaser, 2000). Therefore present investigation was designed to know the latest status of the disease.

II. Materials & Methods

From various towns' areas of Nainital and Udham Singh Nagar districts of Uttarakhand 759 samples, consisting of human stool (50) and meat of poultry (251), chevon (183), pork (127), fish (106) as well as carabeef (42) were collected for the isolation of Campylobacter spp. The isolation and identification of Campylobacter spp. was carried out as per the procedures outlined by OIE terrestrial manual (2008) with necessary modification. Morphological, biochemical and serological characterization of the Campylobacter genus was done by methods of Prasanna (2013).

III. Results and Discussion

Epidemiology of campylobacter in various samples was depicted in table 1. Out of 251 processed chicken meat samples 34 (13.54%) were found to be Campylobacter, in concomitant to Rajkumar *et al*., (2010) observation of 18% from unorganized and 12% from organized farms in Uttar Pradesh. Among 42 carabeef samples, none could recover the target bacterium in accordance with Wieczorek et al., (2012). Of 127 pork samples, only 1 (0.78%) revealed the presence of Campylobacter spp. similar to Little et al., (2008). Out of 106 fish meat samples processed, none could show presence of Campylobacter, as eating fish has never been found a risk factor (Loewenherz-Lüning et al., 1996). A total of 50 human stool samples elucidated only 1 (2%) Campylobacter and identified to be *C. jejuni* concomitant to Pant (2011). Out of 183 chevon samples 14 (7.6%) Campylobacter could be isolated, similar to the findings of Rahimi (2010), who reported a prevalence rate of 6.4% in chevon purchased from retail outlets in Iran. Molecular techniques revealed 35 isolates as C. *jejuni* and 15 as *C. coli*.

Table 1: Epidemiology of Campylobacter from different samples

S. No.	Sample	Total no. of samples	Positive samples	Prevalence rate
1.	Chicken Meat	251	34	13.54%
2.	Chevon	183	14	7.6%
3.	Pork	127	01	0.78%
4.	Fish Meat	106	01	2%
5.	Carabeef	42	00	0%
6.	Human Stool	50	00	0%

Out of all 50 thermophillic campylobacters obtained in the present study, 30 isolates (20 C. jejuni and 10 C. coli) were subjected to antibiotic sensitivity investigation against 8 antimicrobial agents viz; Ampicillin, Nalidixic acid, Ceftriaxone, Cephalothin, Erythromycin, Suphamethoxazole, Gentamicin and Ciprofloxacin. All the *C. jejuni* isolates examined were found sensitive to Gentamicin and erythromycin and 100% resistant to Cephalothin. While only 55% of the isolates were sensitive against Nalidixic acid and 80%, 50% and 40% resistance was observed against Suphamethoxazole, Ampicillin and Ciprofloxacin respectively. Also 75% isolates showed intermediate resistance against Ceftriaxone (Table 2).

In the case of *C. coli* isolates, 100% resistant to Cephalothin was observed, whereas 70%, 80% and 50% of isolates showed sensitivity against Ciprofloxacin, Nalidixic acid and Gentamicin respectively and 50% isolates were resistant to Ampicillin. As many as 70% isolates exhibited intermediate resistance pattern against Ceftriaxone (Table 3).

All the *C. jejuni* isolates were found to be 100% sensitive to Gentamicin, whereas, 50% of C. coli isolates were resistant to it. All the *C. jejuni* and *C. coli* isolates were found to be resistant to Nalidixic acid and showed intermediate resistance to Ceftriaxone (Table 2). These results were in concord with Rajagunalan (2010). High Gentamicin resistance among C. jejuni has also been reported by Adzitey *et al*., (2012) agreeing with our findings.

In the present study, of the total *C. coli* put to antibiogram, 30% and 50% were found to be resistant against Sulphamethoxazole and Ampicillin, while the resistant was higher for *C. jejuni* isolates. Also 100% resistant was recorded for Cephalothin by *C. jejuni* as well as *C. coli* both in confirmity with the findings of Adzitey et al., (2012); Rajagunalan (2010). Further 40% of *C. jejuni* and 10% of the C. coli isolates were observed to be Ciprofloxacin resistant (Table 3). Resistance to Ciprofloxacin by *C. jejuni* (40.4%) and C. coli (33.3%) were in alliance with the finding by Rahimi et al., (2011).

Table 2: Antibiotic sensitivity pattern of C. jejuni isolates (20)

S. No.	Antibiotics	No. of isolates		
		Resistant	Intermediate	Sensitive
1.	Ampicillin	10 (50%)	2 (10%)	8 (40%)
2.	Nalidixic acid	2 (10%)	8 (40%)	11 (55%)
3.	Ceftriaxone	0 (0%)	15 (75%)	5 (25%)
4.	Cephalothin	20 (100%)	0 (0%)	0 (0%)
5.	Erythromycin	0 (0%)	0 (0%)	20 (100%)
6.	Suphamethoxazole	16 (80%)	4 (20%)	0 (0%)
7.	Gentamicin	0 (0%)	0 (0%)	20 (100%)
8.	Ciprofloxacin	8 (40%)	6 (30%)	6 (30%)

Table 3: Antibiotic sensitivity pattern of C. coli isolates (10)

S. No.	Antibiotics	No. of isolates		
		Resistant	Intermediate	Sensitive
1.	Ampicillin	5 (50%)	1 (10%)	4 (40%)
2.	Nalidixic acid	0 (0%)	2 (20%)	8 (80%)
3.	Ceftriaxone	1 (10%)	7 (70%)	2 (20%)
4.	Cephalothin	20 (100%)	0 (0%)	0 (0%)
5.	Erythromycin	2 (20%)	1 (10%)	8 (80%)
6.	Suphamethoxazole	3 (30%)	6 (60%)	1 (10%)
7.	Gentamicin	2 (20%)	3 (30%)	50 (50%)
8.	Ciprofloxacin	1 (10%)	2 (20%)	7 (70%)

IV. Conclusion

The highest prevalence rate of 13.54% was recorded in poultry meat, followed by 7.6% in chevon, 0.78% in pork and 2% from human stool samples. None of the isolates were recovered from beef and fish meat samples. Of fifty Campylobacter isolates, 20 Campylobacter jejuni and 10 Campylobacter coli were examined for their sensitivity to 8 antibiotics. All of the C. jejuni and C. coli isolates were resistant to Cephalothin (100%) and sensitive to Gentamicin and Erythromycin (100%). While 80%, 50% and 40% resistance was observed against Suphamethoxazole, Ampicillin and Ciprofloxacin respectively. Among C. coli, 70%, 80% and 50% sensitivity was

observed against Ciprofloxacin, Nalidixic acid and Gentamicin respectively and 50% isolates were resistant to Ampicillin. This study indicates significance of chickens as important reservoirs of this enteric pathogen and in transmission and dissemination of campylobacter associated diseases. A substantial proportion of isolates are drug-resistant, which could lead to potential public health issues.

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