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CHICKEN CARCASSES AS A SOURCE OF Campylobacter jejuni IN BELO HORIZONTE, BRAZIL

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SUMMARY

The presence of **Campylobacter jejuni** was investigated in stool specimens from chicken meat workers and in ready-for-market chicken carcasses from one industrial and nine non industrial slaughters in Belo Horizonte. In the latter **C. jejuni** was isolated from 19 (38.0%) of the 50 chicken carcasses and from 2 (13.3%) of the stool specimens obtained from 15 chicken meat workers. In the industrial slaughter it was found in only 1 (2.0%) of the 50 chicken carcasses and it was not isolated from any of the 40 stool specimens. There was a significant difference between industrial and non industrial slaughter in regard to the frequence of **C. jejuni** isolation from carcasses ($p = 0.000002$), probably due to the low hygiene conditions present in non industrial slaughters. The results of antimicrobial susceptibility tests, SDS gel electrophoresis and biotyping of the strains isolated from stool specimens obtained from chicken meat workers were similar to those observed in strains isolated from chicken carcasses which suggest that chicken could be the source of **C. jejuni** for the workers and both, chicken and workers, could be implicated in the transmission of **C. jejuni** infection in Belo Horizonte.

KEY WORDS: Campylobacter jejuni; Chicken carcasses; Slaughters; **Campylobacter jejuni** transmission.

INTRODUCTION

Campylobacter jejuni is an important enteric pathogen and the diarrhea caused by this microorganism is a significant cause of morbidity and mortality among Brazilian children[11]. Some questions concerning the transmission of this agent remain unanswered. Contaminated water or food and unpasteurized milk have been implicated as vehicles[3]. It has also been postulated that human infection may occur either by person-to-person contact or by direct contact with animals[17]. Evidences indicate that the environmental reservoir of **C. jejuni** may be varied and include food animals, such as chickens[2]. A high incidence of the microorganism has been observed among broiler chicken carcasses and chickens from a live poultry market[7]. It is thought that the handling and consumption of undercooked poultry is one of the most common means of **C. jejuni** transmission to man[1, 9, 15]. Furthermore, as demonstrated by SIMMONS & GIBBS[12], the microorganism could survive on chicken carcasses during frozen storage.

The purpose of this study was to estimate the pravalence of **C. jejuni** in chicken carcasses and in feces of meat workers from two kinds of Brazilian slaughters, industrial and non industrial, because little information is available on

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the sources and mode of transmission of human **C. jejuni** diarrhea in Belo Horizonte, Brazil, where this enteritis occurs very frequently causing a prolonged and severe illness in up to 20% of the patients[11].

MATERIAL AND METHODS

Ten slaughters cooperated with this study: one federally inspected (industrial) and 9 not federally inspected (non industrial). In the industrial slaughter there are separate rooms for the various stages of processing including killing, scalding, eviscerating, chilling and packaging. After killing, the carcasses are scalded at 60°C in chlorinated water (100 ppm) and before packaging they are chilled overnight in chlorinated ice water (100 ppm). Chlorination of the water is required by the Brazilian Department of Agriculture. Non industrial slaughters are very numerous in Brazilian cities. They do not have separate rooms for processing and do not use chlorinated water to rinse the carcasses. The hygiene conditions in this kind of slaughter are precarious.

C. jejuni was investigated in 100 ready-for-market chicken carcasses from industrial (n = 50) and from non industrial (n = 50) slaughters. A sterile swab was rubbed against the surface of the chicken carcasse and then it was placed into tubes of transport medium [modified CHAN & MACKENZIE[5], with FBP[6] and Butzler's antimicrobial supplement[4]].

The microorganism was also searched in 55 stool specimens obtained from chicken meat workers from industrial (n = 40) and non industrial (n = 15) slaughters (The group of workers from non industrial slaughters did not want to cooperate, so we studied only specimens from 15 persons).

The swabs and stool specimens were streaked onto Butzler's medium[4] and incubated at 42°C in microaerophilic atmosphere for 48 h.

All colonies that were oxidase positive, catalase positive, Gram negative curved, "gull wing", "S" or spiral shaped rods with corkscrew or darting motility were presumptively identified as **C. jejuni.** The strains were further biotyped with data obtained from DNAse and hippurate hydrolysis tests, H_2S production, growth at 37°C and 25°C, growth on CYE agar and in presence of 0.04% 2,3,5 triphenyltetrazolium chloride and sensivity to nalidixic acid[8, 11, 14, 19].

The antimicrobial susceptibility of the strains was tested by disk diffusion method using Mueller-Hinton agar supplemented with 5% sheep blood and disks of amikacin, ampicillin, chloramphenicol, erythromycin, gentamicin, kanamycin, neomycin, trimethoprim-sulphamethoxazole, and tetracycline from Difco Laboratories[11].

The strains of **C. jejuni** isolated from chicken carcasses and from feces of chicken meat workers were examined by sodium dodecyl sulphate (SDS)-polyacrylamide gel eletrophoresis according to LAEMMLI[10] and TAYLOR et al[18]. A strain of **Helicobacter pylori** was also used for comparison.

Data were compared by the Fischer's exact test and differences were taken as significant when $p < 0.05$.

RESULTS

In non industrial slaughters, **C. jejuni** was isolated from 19 (38.0%) of the 50 chicken carcasses and from 2 (13.3%) of the stool specimens obtained from 15 chicken meat workers. In the industrial slaughter it was found in only 1 (2.0%) of the 50 chicken carcasses and it was not isolated from any of the 40 stool specimens (Table 1).

There was a significant difference between industrial and non industrial slaughter in regard to the frequence of **C. jejuni** isolation from carcasses ($p = 0.000002$). On the other hand, significant difference was not observed between industrial and non industrial slaughters concerning the rates of **C. jejuni** isolation from stool speci-

TABLE 1
Campylobacter jejuni isolation rates from chicken carcasses and from stool specimens of chicken meat workers.

Slaughters	carcasses			meat workers' stools		
	Nº	%	(Total)	Nº	%	(Total)
Industrial	1	2.0	(50)	0	0.0	(40)
Non industrial	19	38.0	(50)	2	13.3	(15)
Total	20	20.0	(100)	2	3.6	(55)

mens obtained from chicken meat workers (p = 0.07070).

All strains of **C. jejuni** were classified as biotype I according to SKIRROW & BENJAMIN[14]. According to HEBERT et al[8] and TEE et al[19] four of the strains isolated from carcasses of non industrial slaughters were classified as biotype III sub biotype 1 and the others (2 from feces and 16 from carcasses), were biotyped as biotype IV sub biotype 1.

The susceptibility of the strains to antimicrobial agents is shown on Table 2.

TABLE 2
Antimicrobial susceptibility of **Campylobacter jejuni** strains isolated from chicken carcasses and from stool specimens of chicken meat workers'.

Antimicrobial agents	C. jejuni strains	
	carcasses (n = 20)	stools (n = 2)
Amikacin	20	2
Ampicillin	18	2
Chloramphenicol	20	2
Erythromycin	20	2
Gentamicin	20	2
Kanamycin	20	2
Neomycin	20	2
Trimethoprim-sulphamethoxazole	00	0
Tetracycline	19	2

The protein profiles of **C. jejuni** isolated from chicken carcasses were similar to those recovered from stool specimens and different from the profiles of an **H. pylori** strain (Fig. 1).

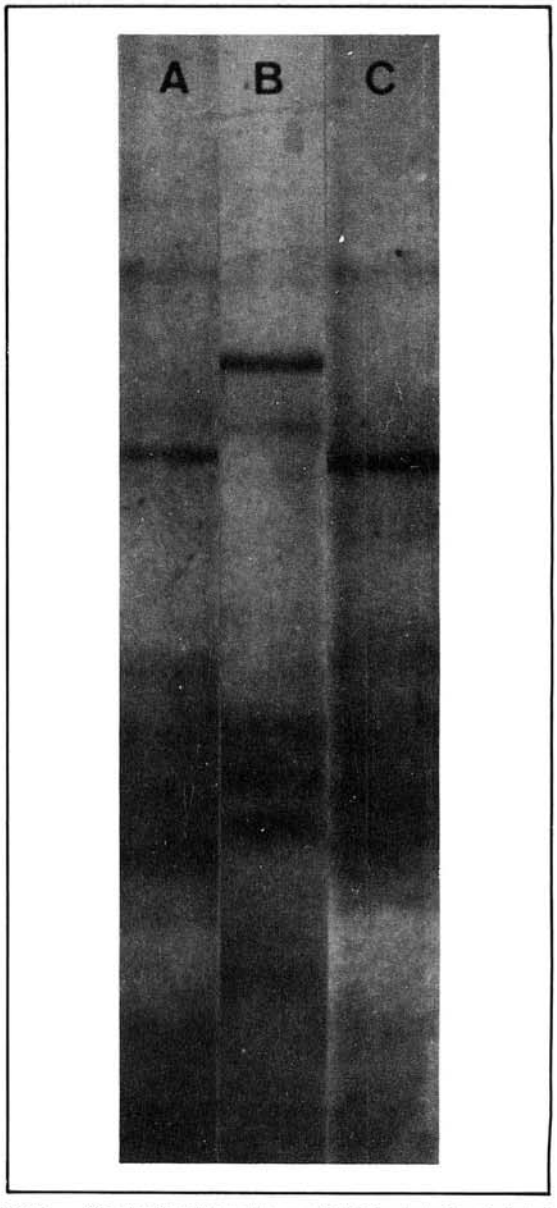

Fig. 1 — Electrophoretic patterns of **C. jejuni** strains isolated from stool specimen of chicken meat worker (A) and chicken carcasse (C) and a strain of **H. pylori** (B).

DISCUSSION

Many studies have revealed that **C. jejuni** is one of the most common causative agent of human enteritis throughout the world[4, 13] and the transmission of the microorganism can take place via a number of different routes. Domestic animals such as chickens harbour **C. jejuni** in their intestines as part of the indigenous flora[17] and this can result in contaminated products from these animals.

Several studies from different places in the world have reported incidences of 22 to 92% of **C. jejuni** on the market poultry meat[16]. In the present investigation **C. jejuni** was found in 38.0% of 50 chicken carcasses from non industrial slaughters and in only one carcasse from the industrial slaughter. The differences observed in the isolation rate of **C. jejuni** between the two kinds of slaughters are probably due to the low hygiene conditions present in non industrial slaughters. On the other hand, in the

industrial slaughter, the adequate processing of carcasses such as overnight chilling in chlorinated water could explain the low rate of **C. jejuni** isolation.

We also searched for **C. jejuni** in feces of chicken meat workers who have a potential occupational contact with the microorganism , because this group of people could be a reservoir of **C. jejuni** and could be responsible for person-to-person transmission. We isolated **C. jejuni** from 2 (13.3%) stool specimens. The results of antimicrobial susceptibility tests, SDS polyacrilamide gel electrophoresis and biotyping of the strains isolated from stool specimens obtained from chicken meat workers were similar to those observed in strains isolated from chicken carcasses. These findings suggest that chicken could be the source of **C. jejuni** for the workers and both, chicken and workers, could be implicated in the transmission of **C. jejuni** infection to people who live in peripheral areas of the city, in the vicinity of non industrial slaughters and, in whom it has been demonstrated that the incidence of **C. jejuni** diarrhea is higher[11].

RESUMO

Carcaças de frango prontas para consumo como fonte de infecção entérica pelo Campylobacter jejuni, **no Brasil.**

C. jejuni foi pesquisado em carcaças de frango prontas para consumo e em fezes de magarefes de 9 abatedouros não industriais e 1 industrial, tendo sido isolado em 19 (38,0%) dentre 50 carcaças e em 2 (13,3%) dentre 15 amostras de fezes provenientes dos abatedouros não industriais e em 1 (2,0%) dentre 50 carcaças do abatedouro industrializado. Neste último, o microrganismo não foi isolado de nenhuma das 40 amostras de fezes examinadas. O perfil eletroforético em gel de poliacrilamida, as características bioquímicas e o padrão de susceptibilidade aos antimicrobianos apresentados pelas amostras isoladas das carcaças foram muito semelhantes aos das amostras isoladas das fezes de magarefes, o que sugere que as galinhas podem ser a fonte de **C. jejuni** para os magarefes e que ambos podem estar envolvidos na transmissão do microorganismo.

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