Prevalence of Campylobacter spp. in Nigerian Indigenous Chicken in Sokoto State Northwestern Nigeria.

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Citation

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Abstract

The study was carried out to determine the prevalence of Campylobacter spp. in Nigerian indigenous chickens and to characterize the isolated strains using phenotypic methods and biotyping. Of the 866 samples collected 672(77.6%) were campylobacter positive. A total of 828 strains of Campylobacter spp were isolated which were identified using biochemical methods. The species identified from the study were C. jejuni 556(67.2%); C. coli 179(21.6%); C. lari 62(7.5%) and C. upsaliensis 31(3.7%). The biotyping of isolates yielded C. jejuni (biotype I, 355(63.9%); biotype II, 139(25.0%); biotype III, 54(9.7%) and 8(1.4%) for biotype IV); C. coli (biotype I, 102(57.0%) and biotype II, 77(43.0 %)) and C. lari (biotype I, 37 (59.7%) and biotype II, 25(40.3%)). The study has demonstrated the carriage of Campylobacter in Nigerian indigenous chicken. The role of the Nigeria indigenous chicken in the transmission of the campylobacter is unknown, but the frequency with which birds are associated with these organisms suggests that they may have an important role in their dissemination.

INTRODUCTION

Campylobacter spp are recognized worldwide as the major cause of human enteritis (Hascelik et al. 1991: Pearson and Healing, 1992: Taylor, 1992: Logan et al.1999). Although several animal species have been shown to carry campylobacters and a variety of vehicles of human infection have been demonstrated (Garcia et al. 1983: Atabay and Corry, 1997, 1998; Ridsdale et al. 1998, 1999). Avian carriage of Campylobacter has been regarded as a potential hazard to human health, either through consumption of undercooked carcass or by contamination of water supplies (Skirrow, 1994: Varslot et al. 1996). A wide variety of avian species, including domestic chickens, turkeys, ducks, pigeons, quail, waterfowls, geese and ostriches, habour Campylobacter spp (Pacha et al. 1988: Yogasundram et al1989: oyarzabal et al. 1995; Aydin et al. 2001: Broman et al. 2004). However, they are unevenly distributed among species, and the feeding behaviour of birds has been shown to influence the Campylobacter colonization rate (Waldenstrom et al. 2002).

The Nigerian indigenous chickens are raised on a small in most households in rural and semi-urban areas of Northwestern Nigeria. The chickens are reared as free range and may therefore; contaminate water and the surrounding environment. Their habits bring them into close contact with human, grazing animals and even dogs and cats. They may constitute a potential public health risk in relation to Campylobacter infections in humans and animals. The study was therefore conducted to determine the prevalence of thermophilic Campylobacter and their biotypes in Nigeria indigenous chicken.

MATERIALS AND METHODS

Between December, 2007 and November, 2008, 866 indigenous chickens were sampled across the state for Campylobacter spp. Feacal material was obtained from the chicken by cloacal swab. The feacal material so obtained was placed directly into Amies transport medium (Oxoid, CM425) and transported to the laboratory immediately. At the laboratory the transport broth were incubated at 37oC for 72h before subculture to mCCDA (modified charcoal cefoperazone deoxycholate agar; Oxoid, CM739 plus SR155) and incubated at 42oC for 72h microaerobically (CampyGen; oxoid; CN35A) in an anaerobic jar, and were examined after 24, 48 and 72h incubation. Suspect colonies were Gram stained and tested for the production of oxidase and catalase. Colonies giving reaction typical for

Campylobacter were purified by streaking onto blood agar. All the isolates were characterized using standard Campylobacter phenotypic identification procedures described by Atabay and Corry (1997), such as hippurate hydrolysis, rapid production of hydrogen sulphide DNA hydrolysis, aerobic growth at 37oC, microaerobic growth at 37oC and 43oC.

Biotyping of isolates was carried out using the extending biotyping scheme of Lior, (1984). The scheme is based on hippurate hydrolysis; rapid production of hydrogen sulphide in FBP broth and DNA hydrolysis.

RESULTS

Of the 866 chickens examined, 672 (77.6%) were found to be carrying campylobacters. More than one species of Campylobacter were isolated from 260 (30%) of the samples. The species of Campylobacter species identified in this study are C. jejuni, C. coli, C. lari, and C. upsaliensis. A total of 828 strains of Campylobacter spp were isolated which were identified using biochemical methods. The isolation rates of the Campylobacter spp are C. jejuni 556(67.2%); C. coli 179(21.6%); C. lari 62(7.5%) and C. upsaliensis 31(3.7%) as shown in table I.

Figure 1

Table I: Isolation rates of spp from Nigerian indigenous chickens.

Campylobacter spp.	Number and percentage isolates
Campylobacter jejuni	556(67.2%)
Campylobacter coli	179(21.6%)
Campylobacter lari	62(7.5%)
Campylobacter upsaliensis	31(3.7)
Total	828(100%)

Bioyping of the isolates were carried out for Campylobacter jejuni, Campylobacter coli, and Campylobacter lari strains. The C. jejuni biotypes were biotype, I 355(63.9%); biotype II, 139(25.0%); biotype III, 54(9.7%) and 8(1.4%) for biotype IV (Table II). The C. coli biotypes were biotype I, 102(57.0%) and biotype II, 77(43.0 %); the biotypes of C. lari were 37 (59.7%) and 25(40.3%) for biotype I and II respectively (Table II).

Figure 2

Table II: Percentage distribution of

Campylobacter strains	Biotypes	Isolation rate (%)
Campylobacter jejuni	I	355(63.9%)
	II	139(25.0%)
	III	54(9.2%)
	IV	8(1.4%)
Campylobacter coli	I	102(57.0%)
	II	77(43.0%)
Campylobacter lari	I	37(59.7%)
	II	25(40.3%)

DISCUSSION

The prevalence of Campylobacter spp in Nigerian indigenous chicken from this study is 77.6%, thus demonstrating the significance of the chickens as reservoirs of Campylobacter spp. The carrier rate of Campylobacter organism examined in this study is higher than those obtained from broiler, 94.2% (workman et al. 2005), but lower than 45.9% by Atanassova and Ring (1999) and 60% by Georgios (2004) from broiler chickens. The free-range nature of rearing the chickens exposes them to both human and animal wastes and other potential sources of enteric pathogens. The management system can lead to the contamination of environmental sources such as water by the faeces of the chickens and the organism can easily be transmitted to humans and animals via this environmental sources. Varslot et al., (1996), described water-borne outbreaks of Campylobacter jejuni infections in humans in Norway. These epidemics were traced to contamination of drinking water by faeces of birds (geese). In Nigeria, the indigenous chickens are always in close contact with other animals and humans, and considering the zoonotic nature of Campylobacter, It can be contracted through close contacted with infected animals (Blaser et al., 1983).

The high isolation rate of 67.2% of C. jejuni from chickens in this study is in agreement with reports of other studies by Nielsen et al. (1997), Shane, (2000), Wedderkopp et al. (2001), Aydin et al. (2001) and Geogios et al.(2004). The low isolation rate of C. coli from chickens in this study is however, in line with the findings that C. coli has a lower rates of isolation than C. jejuni, from chicken as reported by Atanassova and Ring, (1999), Christopher et al., (1982) and Smith, (1995). The very low isolation rate of C. upsaliensis (3.0%) from chickens in this study was expected, because the body temperature of chicken does not favour their survival in chicken. The free range nature of local chicken may possibly expose the chicken to C. upsaliensis through feeding on faeces of other domestic animals and even pets which are reported to habour C. upsaliensis (Workman et al., 2005). The observations in this study agreed with

observations of Atanassova and Ring, (1999) and Baserisalihe et al., (2007) who also reported very low isolation rates of C. upsaliensis from poultry birds.

The biotyping scheme of Lior (1984), divided the C jejuni from this study into Biotypes I, II, III, IV and C. coli into two biotypes I and II. This observation is an indication that the indigenous chicken can harbour diverse strains of Campylobacter. Lior (1984), observed that Campylobacter jejuni strains isolated from humans and animals were biotype I. The isolation of Campylobacter jejuni biotype I from the indigenous chickens is of serious public health importance, as Campylobacter jejuni biotype I has been implicated in human campylobacteriosis. The indigenous chicken should be regarded as a potential reservoir for human and animal infection with Campylobacter. Campylobacter jejuni is the main causative agent of food-borne gastroenteritis in humans, and also causes a variety of disease, such as enteritis, abortion, septicaemia and mastitis, in animals (Aydin, et al, 2001).

The role of the Nigeria indigenous chicken in the transmission of the Campylobacter is unknown, but the frequency with which birds are associated with these organisms suggests that they may have an important role in their dissemination. This study has demonstrated the carriage of Campylobacter in Nigerian indigenous chicken which have not previously been investigated.

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