Short Communication

Prevalence of *Campylobacter* species in apparently healthy goats in Sokoto state (Northwestern) Nigeria

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A total of 1312 rectal swabs (faecal) samples were collected from apparently healthy goats across Sokoto state and processed for *Campylobacter* organisms. 264 (20.1%) of the samples were positive and yielded 272 *Campylobacter* species. *Campylobacter* species isolated in this study were *Campylobacter jejuni* 169(62.1%), *Campylobacter coli* 58(21.3%), *Campylobacter lari* 24(8.8%), *Campylobacter upsaliensis* 13(4.8%) and *Campylobacter sputorum* 8(3.0%). Biotyping of the isolates indicated that *C. jejuni* biotype I (52.6%) and *C. coli* biotype II (82.8%) were the most common biotypes while all the *C. lari* isolates were biotype I. The isolation of *Campylobacter* organisms and the identification of *C. jejuni* biotype I and *C. coli* biotype II from goats in this study is a clear indication of the presence of *Campylobacter* in goats in Sokoto state. *Campylobacter* organisms must be considered as potential agent of enteritis and abortion in goats as well as a serious public health problem.

Key words: Biotypes, *Campylobacter*, *Campylobacter jejuni*, *Campylobacter coli*, Nigeria, prevalence, goats.

INTRODUCTION

In Nigeria, small ruminants (sheep and goats) constitute about 35% of the total meat supply (FAO, 1995). Sheep and goats have played very important role in offsetting the protein deficiencies which are fairly rampant in the country. There are about 24,500,000 goats in Nigeria (FAO, 1995). There is a growing appreciation of the importance of goats in small-scale integrated farming system in developing countries (Devendra and McLeroy, 1992). The small ruminants provide a subsidiary source of income and a safeguard against crop failures. Because of the growing human population and concomitant pressure on traditional grazing lands, small ruminant production in urban and semi-urban areas is on the increase. The Sokoto red goats are the predominant breed of goats in the north-western part of Nigeria. The goats are often kept with cattle, sheep and poultry with very poor veterinary inputs and hygiene. The husbandry systems under which goats are reared in Sokoto, Nigeria bring them in close contact with humans and other animals including dogs and cats.

*Campylobacter jejuni* have been reported among healthy and diseased farm animals (Olubunmi and Adeniran, 1986; Jiwa et al., 1994; Raji et al., 2000). The natural habitat of most *Campylobacter* spp. is the intestine of birds and other warm-blooded animals, including seagulls and several other wild birds (Kapperud and Rosef, 1983). The role of *Campylobacter* as a cause of enteric disease in man was not fully recognized until the development of isolation methods and selective media during 1970 (Penner, 1988). Campylobacteriosis is primarily a food-borne disease, because of its low infective dose, it has been estimated that 500 cells of *C. jejuni* can cause human illness (Black et al., 1988). It therefore, implies that even small number of *Campylobacter* cell in water or food due to faecal contamination may be a potential health hazards. The risk factors associated with the infection include occupational exposure to farm animals, consumption of raw milk or milk products and unhygienic food preparation practices (Alterkruse et al., 1999). It has been suggested that difficulty in *Campylobacter* detection is responsible for deficiency in the accu-
rate information concerning Campylobacter infection in developing countries (Baserisalehi et al., 2006), but Campylobacter is hyperendemic in developing countries. The objective of the study was to establish the presence and determine the prevalence of Campylobacter spp. in goats in Sokoto state.

MATERIALS AND METHODS

A total of 1312 faecal samples were collected from apparently healthy goats in Sokoto state (Northwestern Nigeria) over a period of 2 years (October 2006 to February, 2009). The samples were collected from each animal via the rectum with a sterile swab sticks and were transferred to the laboratory within 2 h of collection. The samples were inoculated directly on blood free charcoal selective agar (mCCDA, Oxoid, CM739) supplemented with CCDA selective supplement (Oxoid, SR155E) and incubated at 42°C for 48 h under micro-aerophilic condition by the use of CampyGen (oxoid, CN 35A). From each of the positive agar plates, 2 - 3 typical Campylobacter colonies were subcultured and tested for Gram-staining, motility, production of oxidase and catalase. The isolates were stored in bisulphate pyruvate (RBP) with 15% (V/V) glycerol at -20°C prior to biochemical characterization and biotyping. The biochemical characterization was carried out using standard Campylobacter phenotypic identification tests recommended by Atabay and Corry (1997). Biotyping of the Campylobacter isolates was carried out using the Lior scheme (1984). The scheme requires hippurate hydrolysis, servoirs in the dissemination of Campylobacter species (Workman et al., 2005; Basiri, 2005; Verma et al., 2005; Baserisalehi et al., 2007; Uaboi-Egbenni et al., 2008)

The frequently isolated Campylobacter species from goats in this study was C. jejuni with isolation rate of 62.1%. The higher rate of isolation of C. jejuni from goats is of serious public health concern, as environmental sources such as water can be contaminated with goats’ faeces and the organisms can easily be transmitted to humans and animals via these environmental sources. The lower isolation rate of C. upsaliensis and C. sputorum and non-isolation of other non-thermophilic Campylobacter may be due to the incubation temperature of 42°C which enhances the growth of thermophilic Campylobacter species. The use of microaerobic generating packs (CampyGen, Oxoid, N35A) may have further suppressed the growth of non-thermophilic Campylobacter species (Workman et al., 2005). C. jejuni is the main causative agent of food-borne gastroenteritis in humans and also causes a variety of diseases, such as enteritis, abortion, septicaemia and mastitis in animals (Aydin et al., 2001).

The most predominant biotype of C. jejuni in this study was biotype I; however, C. jejuni biotypes III and IV were also identified. This implies that goats can harbour diverse strains of C. jejuni. C. jejuni biotype I have been isolated from human and animal (Lior, 1984). This indicates that goats can be regarded as a potential reservoir for human and animal campylobacteriosis. Campylobacter

RESULTS

Of all the 1312 faecal samples collected and analyzed for Campylobacter spp., 264 samples were positive for Campylobacter spp. It is apparent that 20% of the goats harboured Campylobacter spp. The Campylobacter spp isolated from the positive samples were C. jejuni, C. coli, C. lari, C. upsaliensis and C. sputorum. A total of 272 species of Campylobacter were isolated and identified as follows: C. jejuni 169 (62.1%), C. coli 58 (21.3%) and C. lari 24 (8.8%). Others are C. upsaliensis 13 (4.8%) and C. sputorum 8 (3.0%) (Table 1).

The biotyping of the Campylobacter (C. jejuni, C. coli and C. lari) shows that C. jejuni biotype I 89 (52.6%), C. coli biotype II 48 (82.8%) and C. lari biotype I 24 (100%) were the most predominant biotypes of the isolates. Other biotypes identified in this study were C. jejuni, biotypes III and IV and C. coli biotype I 10 (17.2%) (Table 2).

DISCUSSION

The study demonstrated the significance of goats as reservoirs in the dissemination of Campylobacter species. The isolation of more than one Campylobacter species suggest that goats can harbour a variety of Campylobacter species. The prevalence of Campylobacter spp. in goats from this study was 20%. This is however, relatively low when compared with the isolation rates in other domestic animals and livestock as reported in literatures (Stanley and Jones, 2003; Sato et al., 2004; Workman et al., 2005; Verma et al., 2005; Baserisalehi et al., 2007; Uaboi-Egbenni et al., 2008).

The isolation of more than one Campylobacter species from apparently healthy goats in Sokoto state (Northwestern Nigeria) over a period of 2 years (October 2006 to February, 2009). The samples were collected from each animal via the rectum with a sterile swab sticks and were transferred to the laboratory within 2 h of collection. The samples were inoculated directly on blood free charcoal selective agar (mCCDA, Oxoid, CM739) supplemented with CCDA selective supplement (Oxoid, SR155E) and incubated at 42°C for 48 h under micro-aerophilic condition by the use of CampyGen (oxoid, CN 35A). From each of the positive agar plates, 2 - 3 typical Campylobacter colonies were subcultured and tested for Gram-staining, motility, production of oxidase and catalase. The isolates were stored in bisulphate pyruvate (RBP) with 15% (V/V) glycerol at -20°C prior to biochemical characterization and biotyping. The biochemical characterization was carried out using standard Campylobacter phenotypic identification tests recommended by Atabay and Corry (1997). Biotyping of the Campylobacter isolates was carried out using the Lior scheme (1984). The scheme requires hippurate hydrolysis, rapid production of H₂S and Deoxyribonuclease enzyme production (DNase) tests.

Table 1. Percentage distribution of the different strains of Campylobacter from the positive samples.

<table>
<thead>
<tr>
<th>Species</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>C. jejuni</td>
<td>169 (62.1%)</td>
</tr>
<tr>
<td>C. coli</td>
<td>58 (21.3%)</td>
</tr>
<tr>
<td>C. lari</td>
<td>24 (08.8%)</td>
</tr>
<tr>
<td>C. upsaliensis</td>
<td>13 (04.8%)</td>
</tr>
<tr>
<td>C. sputorum</td>
<td>8 (03.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>272 (100%)</td>
</tr>
</tbody>
</table>

Table 2. Distribution of the different Campylobacter biotypes from the isolates.

<table>
<thead>
<tr>
<th>Campylobacter spp</th>
<th>Biotypes</th>
<th>Distribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. jejuni</td>
<td>I</td>
<td>89(52.6)</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>00(00.0)</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>00(00.0)</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>15(8.9)</td>
</tr>
<tr>
<td>C. coli</td>
<td>I</td>
<td>10(17.2)</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>48(26.8)</td>
</tr>
<tr>
<td>C. lari</td>
<td>I</td>
<td>24(100)</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>00(00.0)</td>
</tr>
</tbody>
</table>
coli biotype II was the most common C. coli biotype isolated from goats in this study, while all the C. lari isolates were biotype II. Campylobacter coli and C. lari biotypes have been reported in other species of domestic animals and livestock such as cattle, sheep, camel, pigs, poultry and even dogs and cats (Raji et al., 2000; Hutchison et al., 2004; Workman et al., 2005; Baserasalehi et al., 2007; Uaboi-Egbenni et al., 2008). The implication of these findings is that C. jejuni biotype I is the common cause of the disease in humans, hence their isolation from goats is of serious public health concern. The finding from this study has clearly shown that goats in Sokoto state harbour Campylobacter species.

REFERENCES