AN EPIDEMIOLOGICAL STUDY ON CAMPYLOBACTER ENTERITIS IN MALTA

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Introduction

Campylobacteriosis refers to the group of infections caused by gram-negative bacteria belonging to the genus *Campylobacter*. It is amongst the most common bacterial infections of humans in all parts of the world. Campylobacters cause both diarrhoeal and systemic illnesses and are also associated with gastritis and peptic ulcer disease. Infection of domesticated animals with campylobacters is also widespread.

The recognition of *Campylobacters jejuni* (and related species) as a common cause of human enteritis has become well-established only within the past 10 years. Various studies in several developed countries indicate that *C.jejuni* is the most common bacterial cause of acute gastrointestinal infection in humans, exceeding rates of illness caused by both *Salmonella* and *Shigella*.

Concern among food microbiologists about *C.jejuni* was raised after epidemiological evidence from many outbreaks implicated foods in the transmission of the organisms to humans. The organism's optimal growth temperature and its requirements for reduced levels of oxygen are provided within the enteron of poultry and warm-blooded domestic animals. Because the organism is commensal within the intestine of live stock, foods of animal origin can easily become contaminated.

The aim of this study was to provide an exhaustive review of the literature on the subject and to determine the incidence of *C.jejuni* and *C.coli* in Malta which are enteropathogenic to man and animals.

Methodology

An epidemiological evaluation of the local situation was carried out by sampling the major Campylobacter sources. These mainly included animals such as, chickens, ducks, pigeons, rabbits, dogs and cats as well as processed and unprocessed foods such as sausages and burgers and pig, cow, and chicken carcasses, respectively. Untreated water and raw milk specimens were also investigated. The choice of both animals and food samples was influenced by those sources which were most often implicated by similar foreign studies in both sporadic and outbreaks of gastrointestinal infection with Campylobacters. Animal samples included faeces and rectal/cloacal swabs while food samples were investigated by either taking surface swabs of the specimen or by direct inocculation of the enrichment broth with a food extract. The samples

were transported in transport medium. A selective, enriched medium was used for the isolation and identification of the organism. The identification of isolated Campylobacter Species was carried out according to Skirrow's method* . The organisms were first isolated from the samples identified up to the genus level and then transfered to Thioglycolate Broth. At a later stage the broth was subcultured into blood agar plates and the resultant colonies identified down to the species level using a variety of biochemical tests. Throughout both the isolation and identification procedures appropriate controls were used. This ensured that the media used were not contaminated and that the growth conditions used were appropriate.

The incidence of Campylobacter Enteritis in man was surveyed by the analysis of records (from 1987 - 1991) kept by the Microbiology Department at St. Luke's Hospital. It was not possible to carry out direct investigations on human faecal specimens due to the low incidence of campylobacter enteritis in man in this country, coupled to the limited time available for carrying out such a project.

Results

A total of 363 samples were investigated over a 3 month period for the presence of Campylobacter species, out of which 75 were positive. Only 21 of the positive samples were further identified down to the species level, the remaining 54 samples were unidentifiable by the biochemical identification tests used in this thesis and were classified as 'other campylobacters'. The biochemical identification tests used were aimed at identifying those Campylobacter species, namely *C.jejuni* biotype 1, *C.jejuni* biotype 2 and *C.coli* which produce enteritis in man. The percentage distribution for both identified and unidentified samples positive for Campylobacter species were:

Food samples: pig carcass swabs (n=34), positives - 32.4%, (8.8% *C.coli*, 23.3% other Campylobacters); no isolation was obtained from chicken (n=29) and cow (n=29) carcasses; processed meats (n=5); untreated water (n=18) and raw milk (n=20).

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* written communication through Dr.P. Cuschieri M.D.

Animal samples: chicken and cloacal swabs (n=71), positives - 54.9% (11.3% *C.coli*, 43.6% other Campylobacters); pigeon faeces (wild stock), (n=30), positives - 43.3%, (6.7% *C.jejuni* biotype 1, 6.7% *C.coli*, 30.0% other Campylobacters); duck cloacal swabs (n=11), positives - 9.0%, (9% *C.coli*); duck faeces (n=11), positives 27%, (9.1 *C.jejuni* biotype 1, 9.1% *C.coli*, 9.1% other Campylobacter); turkey cloacal swabs (n=24), positives - 20.8%, (20/8% other Campylobacters); cat rectal swabs (n=8), positives - 12.5%, (12.5% *C.coli*); dog rectal swabs (n=19), positives - 10.5%, (5.3% *C.jejuni* biotype 1, 5.3% *C.coli*). No isolation was obtained from chicken (n=10) and pigeon (n=30) faeces collected from private aviaries.

The frequency of bacterial Enteritis (percentage isolated from diarrhoeal specimens) attributed to known enteropathogens isolated from cases of gastroenteritis in Malta over a 5 year period (1987 - 1991) are summarised below:

1987: Total number of diarrhoeal specimens received (TNDS) 2205, frequency of diagnosed bacterial enteritis (FDBE) - 8.4%, (*Campylobacter* 0.45%, *Salmonella* 4.85%, *Shigella* 1.5%, *E.coli* 1.5%, others 0.14%).

1988: TNDS 2050, FDBE 12.3%, (*Campylobacter* 0.63%, *Salmonella* 10.1%, *Shigella* 0.54%, *E.coli* 0.98%, others 0.1%).

1989: TNDS 2174, FDBE 7.9%, (*Campylobacter* 0.09%, *Salmonella* 6.95%, *Shigella* 0.55%, *E.coli* 0.28%, others 0%).

1990: TNDS 2246, FDBE 8.9%, (*Campylobacter* 0.53%, *Salmonella* 7.93%, *Shigella* 0.18%, *E.coli* 0.27%, others 0%).

1991: TNDS 2437, FDBE 12.2%, (*Campylobacter* 0.49%, *Salmonella* 11.83%, *Shigella* 0%, *E.coli* 0.37%, others 0%).

Discussion

From the analysis of Campylobacter Enteritis cases in man reported over a 5 year period and the practical survey carried out on the major sources of infection the following observations were made:

i) Contrary to what is normally observed in most other European and North American studies, an extremely low incidence of Campylobacter Enteritis cases in man, and contamination and

colonization of food and animal samples respectively was observed in the local study. On the other hand there is a high incidence of Salmonella gastroenteritis cases in man.

ii) contrary to other similar foreign studies, the incidence of *C.coli* (22.7%) is much higher to that of *C.jejuni* (5.3%).

iii) different isolation rates were obtained for the same type of specimens collected from different sources or environments, e.g. wild pigeons and 'homing' pigeons. This suggests that breeding conditions such as hygiene and antibiotic supplemented foods could influence colonization rates.

iv) all are susceptible but he incidence of infection falls with advancing age - infancy (38.8%), 1 - 5 years (30.6%), adolescent (4%), 20 - 30 years (4%), 30 - 40 years (8.2%), 60 years and over (2%) with a minor peak in the 30 - 40 year age group.

v) a higher incidence of Campylobacter Enteritis cases in males (57.1%) than in females (42.9%) was observed.

vi) a higher incidence of Campylobacter Enteritis cases was observed in the cooler Winter months than in the hot Summer months.

vii) a higher incidence of Campylobacter Enteritis cases in rural (41.6%) and suburban area (35.4%) than in urban areas (22.9%) was observed.

The following postulations for the local low incidence of Campylobacter Enteritis were proposed:

i) local high ambient temperatures do not favour viability of the organism.

ii) the high local incidence of Salmonella could possibly determine the low incidence of Campylobacter, due to the competitive antagonistic growth of the latter by the former.

iii) the fact that both cow carcasses and raw milk were Campylobacter free could imply that one of the major sources is Campylobacter free in Malta.

iv) Malta lacks sources of untreated water, e.g. lakes and rivers, therefore another potential source is locally absent.

Bibliography and References

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