

CAMPYLOBACTER ENTERITIS IN CHILDREN

THESIS

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BY

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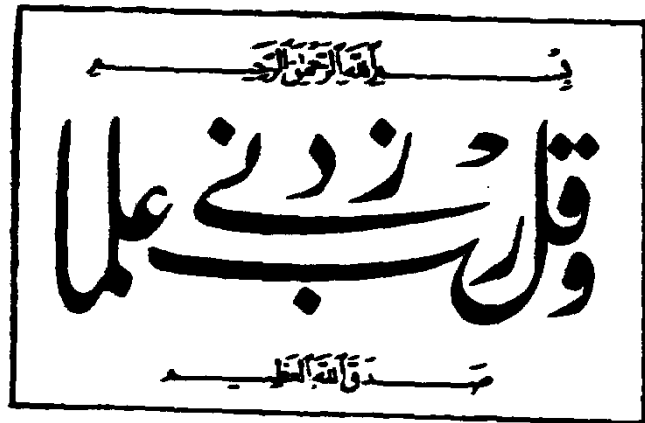
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***This Work is Dedicated to
My Family***

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INTRODUCTION AND AIM OF WORK

INTRODUCTION

Campylobacter jejuni/coli has become recognized as a major cause of gastroenteritis in human beings (Skirrow, 1977)⁹⁵. *Campylobacter enteritis* is a disease of world-wide distribution, but there is a striking difference in its pattern between the advanced countries of the West and the developing world. It is more prevalent in the developing countries especially in young children (Billingham, 1981)³.

Campylobacter enteritis is an acute self-limiting disease which is clinically similar to other types of acute infective diarrhea. The illness starts with a prodromal period of fever, malaise, headache and backache followed by severe watery diarrhea, abdominal pain, nausea and vomiting (Karmali and Fleming, 1979)⁵⁷.

The isolation of *campylobacter* from faeces requires special selective techniques because of their microaerophilic nature and many contaminating organisms found in specimens containing them. The optimum conditions for isolation of the organism from faeces include the use of a selective medium, an atmosphere of reduced oxygen concentration and elevated temperature of incubation (Kaplan, 1980)⁵⁶.

In cases of clinical emergency a rapid bacteriological diagnosis can be made by direct dark-ground or phase-contrast microscopy

of faeces by the characteristic motility and morphology of campylobacter (**Karmali and Fleming, 1979**)⁵⁷.

Aim of the Work

The aim of this work is to study the incidence of infection with campylobacter among children suffering from diarrhea.

***REVIEW
OF
LITERATURE***

TAXONOMY AND CLASSIFICATION

The first classification of campylobacter as a vibrio species was made on the basis of its morphological similarity to *Vibrio cholera*. Both organisms are thin, motile, curved, gram negative rods. However, there are major differences in the biochemical and growth characteristics and in the DNA base nucleotide content between true vibrios and the organisms now classified as campylobacters. Campylobacters are microaerophilic or strictly anaerobic and have guanine plus cytosine content between 30 and 36%. They neither ferment nor oxidize carbohydrates (Sebald and Veron, 1963)⁹⁴. True vibrios ferment selected sugars with acid production, grow in 3% sodium chloride, are facultatively anaerobic and have guanine plus cytosine content of 40 to 50%. In light of these distinct differences, Veron and Chatelain (1973)¹¹¹ suggested that those organisms known as *Vibrio fetus* species and other similar vibrios can be reclassified as belonging to a new genus campylobacter. The name is derived from the Greek campylo meaning curved and bacter meaning rod (Rettig, 1979)⁸⁷.

Although the designation of the genus campylobacter is now widely accepted for this group of bacteria, there is still considerable confusion and controversy about the nomenclature and classification of strains within the genus. The currently accepted species classi-

fication of campylobacters from Bergey's *Manual of Determinative Bacteriology* is listed in Table (1) along with synonyms used in the past (Jones et al., 1931⁵⁴; King, 1957⁶⁰; Florent, 1959³⁶; Veron and Chatelain, 1973¹¹¹). In this schema, there are three species within the genus *Campylobacter*, with the three subspecies of *C. fetus* (ss. *fetus*, ss. *intestinalis*, ss. *jejuni*) being the organisms of importance in animal and human disease. Assignment to species and subspecies depends on the growth and the biochemical characteristics as outlined by Smibert (1974¹⁰⁰, 1978¹⁰¹).

Multiple classification schemata which include analysis of somatic and flagellar antigens have been proposed (Smibert, 1978)¹⁰¹ but the complete antigenic characterization of *C. fetus* has not been accomplished and the current classification of strains based on growth and biochemical strain differences is preferable (Rettig, 1979)⁸⁷.

Campylobacter fetus ss. *fetus* is the agent of enzootic abortion and infectious infertility in cattle and it was first described by Smith (1918)¹⁰². It is not found in human infection.

Campylobacter fetus ss. *intestinalis* was first described as the agent of bovine abortion (McFaydean and Stockman 1913)⁷⁴. Its transmission is by faecal-oral route rather than by venereal

Table (1): Classification of the genus *Campylobacter*

Bergey's Manual Smibert, 1974	Taxonomic classification synonyms according to:			Ecology	Disease states
	Veron and Chatelain, 1973	King, 1957	Florent, 1959 or Jones et al., 1931		
I. <i>Campylobacter</i> fetus ss. fetus	<i>C. fetus</i> ss. venerealis	<i>Vibrio fetus</i>	<i>V. fetus</i> ss. venerealis (Florent, 1959)	Not normal flora; found in bovine semen, preputial fluid, cervical mucus; will not grow in human or animal GI tract	Enzootic abortion and sterility in cattle; venereal transmission; not associated with human disease.
<i>Campylobacter</i> fetus ss. intestinalis	<i>C. fetus</i> ss. venerealis biotype intermedius <i>C. fetus</i> ss. fetus	<i>Vibrio fetus</i>	<i>V. fetus</i> ss. intestinalis (Florent, 1959)	Not normal flora; found in placentas and gastric contents of aborted ovine and bovine fetuses, in bile, GU, and GI tracts, will grow in human and animal GI tracts	Abortion in sheep; sporadic abortion in cattle; oral transmission; usual cause of systemic human disease
<i>Campylobacter</i> fetus ss. jejuni	<i>C. jejuni</i> , <i>C.</i> coli (?)	"Related vibrios"	<i>Vibrio jejuni</i> (Jones, et al., 1931).	Normal GI flora in swine, sheep, cattle, goats, chickens, turkeys, wild birds. Will grow in human and animal GI tracts	Abortion in sheep; enteritis in heifers, calves; avian vibronic hepatitis (poultry); usual cause of human enteritis, occasional sepsis.
II. <i>Campylobacter</i> sputorum ss. sputorum.	<i>C. sputorum</i>	<i>Vibrio</i> sputorum		Normal human oral flora (in gingival crevices)	None described; ? human saprophyte.
<i>Campylobacter</i> sputorum ss. bubulus	<i>C. bubulus</i>	<i>Vibrio</i> bubulus		Normal GU flora in sheep and cattle found in vaginal and preputial mucus, in semen.	None described; ? bovine saprophyte
III. <i>Campylobacter</i> fecalis				Found in sheep feces, bovine vagina, and semen	None described

From (Rettig, 1979)

one. This organism is also responsible for sporadic abortion in cattle and it is the subspecies usually responsible for systemic disease in humans (Smibert, 1978)¹⁰¹. It may result in bacteremia, relapsing fever, endocarditis, pericarditis, meningitis, thrombophlebitis, salpingitis, lung and chest wall abscesses, septic abortions, septic arthritis and Reiter's syndrome (Rettig, 1979)⁸⁷.

Campylobacter fetus ss. *jejuni* was first described by Jones and Little in 1931⁵³ in association with acute diarrheal disease in cows and calves. It is also a sporadic cause of ovine abortion and the etiologic agent of avian hepatitis, a poultry disease. It is synonymous with the "related vibrios" of King (1957)⁶⁰ and is the subspecies usually responsible for acute enteritis in man.

The remaining campylobacter species, *C. sputorum* and *C. faecalis*, are usually found as normal flora of man, cattle and sheep. They are non pathogenic to man (Rettig, 1979)⁸⁷.

CAMPYLOBACTER ORGANISM

Historical Aspect:

Vibrio fetus (now campylobacter) was first isolated in 1909, where it was associated with abortion in sheep and cattle. In 1947, it was cultured from human blood (Vinzent et al., 1947)¹¹⁴. Later, it was recognized as an opportunistic pathogen of debilitated patients (Bokkenheuser, 1970)¹². The possibility that *V. fetus* could be also associated with enteric disease was first described by Elizabeth King (1957)⁶⁰. She observed that *V. fetus* isolates could be divided into two groups on the basis of thermophilic characteristics. The "related vibrios" that were isolated from blood of patients with diarrhea grew best at 42°C (King, 1957)⁶⁰. But, the development of a selective medium for the isolation of these organisms from stool samples was necessary (Dekeyser et al., 1972)²⁹. The first positive stool cultures for these organisms were reported by Butzler, Dekeyser, and colleagues from Belgium (Butzler et al., 1973)²².

Stool specimens were filtered through a 0.65 micron millipore filter and cultured in 5% oxygen atmosphere on thioglycollate agar containing bacteracin, polymyxin, novobiocin and actidione. In 1977, Skirrow, using first a modification of Dekeyser's method and culturing unfiltered stool specimens on blood agar containing vancomycin, polymyxin B. and trimethoprim corroborated the Belgian finding that these organisms are a common cause of diarrhea.