Study of Campylobacter Jejuni Infection in Geriatrics

Thesis

Submitted for Partial Fulfillment of
The Master Degree
In
Internal Medicine

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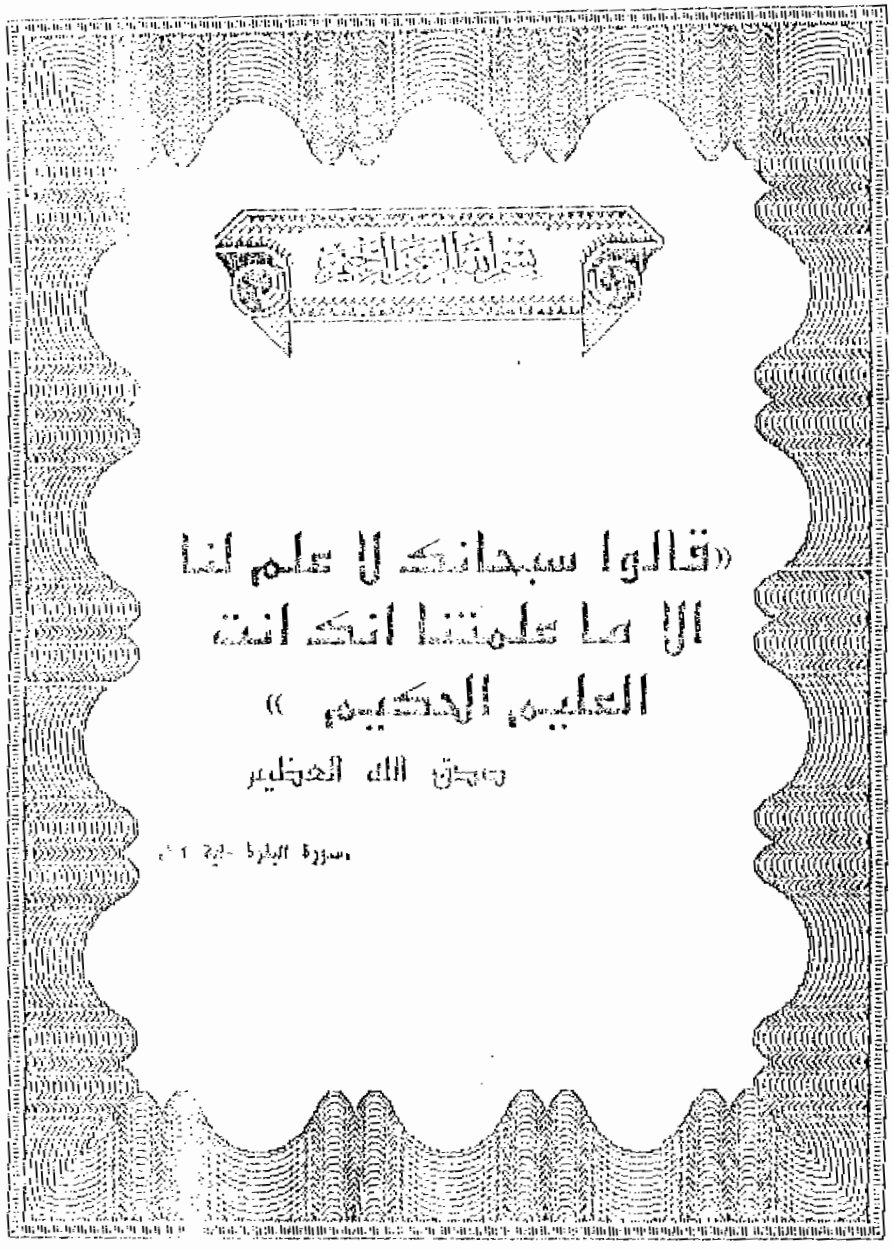
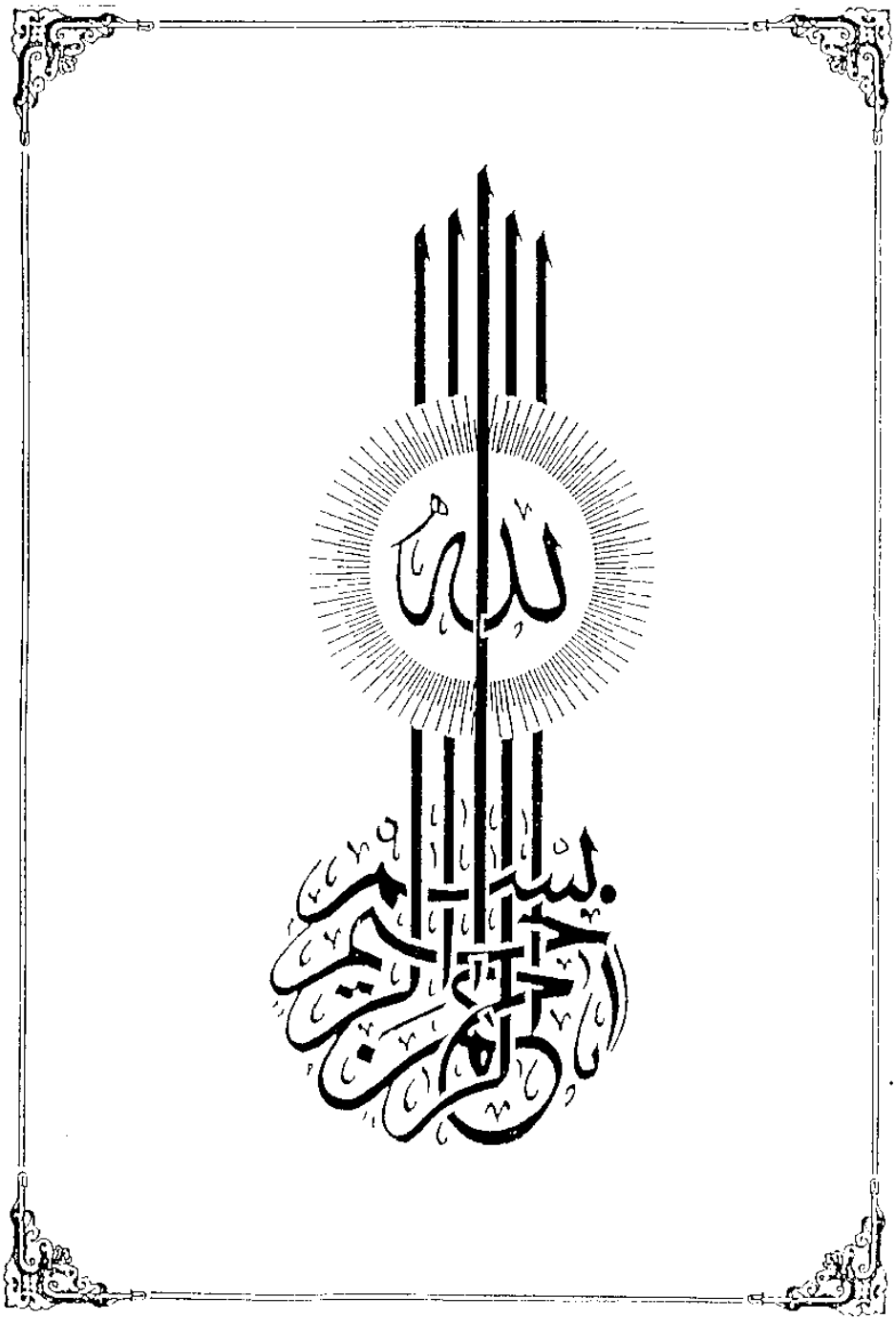
Cairo - Egypt.
1996


بسم الله الرحمن الرحيم
«قالوا سبحانك لا علم لنا
الا ما علمتنا انك انت
العليم الحكيم »
صدق الله العظيم
سورة البقرة - آية ٣٢



Acknowledgement

My gratitude and thanks should be submitted to God for his kind support to me.

I wish to express my sincere gratitude and thanks to Prof. Dr. Motassem Salah Amer, Professor of Internal Medicine, Faculty of Medicine, Ain Shams university, for his constructive supervision, guidance, honest assistance.

I'm greatly indebted to Prof. Dr. Ibrahim Khalil Ali, Professor of Clinical Pathology, Faculty of Medicine, Ain Shams University, for his generous help, supervision and honest guidance.

My deepest thanks and gratefulness to Prof. Dr. Ahmed Shawki Al Sawabi, Professor of Internal Medicine, Faculty of Medicine, Ain Shams University, for his useful advice, guidance and sympathetic help.

I wish to thank every one who give me a hand to bring this work to the light.

Contents

Introduction and Aim of the Work :

Campylobacter jejuni has become recognized as one of the most common enteric pathogens throughout the word *(Blaser and Rellelr, 1981)*. Such organism which is a major cause of gastroenteritis in humans has been currently being isolated as frequently as Salmonella and Shigella Species *(Martin et al., 1984)*. Moreover, in Southern Sweden, C. jejuni is more common cause of bacterial diarrhea than Salmonella, Shigella and Yersinia enterocolitica together *(Walder and Forgren, 1982)*. The increased use of selective media is an important factor in making these organism the most frequently identified bacterial cause of diarrhea *(Jones et al., 1980)*, in many countries. Campylobacter enteritis may simulate appendicitis, mesentric adenitis, intunusception *(Skirrow, 1977)*. Studies on diarrhea in travellers to the developing countries have shown that C. jejuni can be an important cause of traveler's diarrhea *(Mattila and Siitonen, 1992)*. Infection with C. jejuni is a common antecedent to Guillain-Barr's syndrome and may play a role in initiating demyelination. *(Ban Mishu and Blaser, 1993)*. Infection with C. jejuni may associated with transient bacteremia especially in elderly *(Blaser et al., 1985)*.

Aim of the Work :

To study the incidence of C. jejuni infection in old Egyptian persons.

Identification of the organism will be done by direct microscopical examination, different methods of isolation, biochemical reactions.

Historical Aspects :

The name campylobacter is derived from the Greek campylo, meaning "curved" and bacter, meaning "rods" *(Retting, 1979).* Campylobacter enteritis was first reported at the end of the nineteenth century by Theodor Escherich. In several articles he described finding, in the feces of children with diarrhea, spiral organisms that could not be cultured on solid media. unfortunately, these articles were published in German and hence went unrecognized for many decades.

Elizabeth King, in (1957), was the first to recognize that these organisms could be associated with enteric disease : her work was proven in the early 1970s when Butzler et al. isolated these organisms from the feces of children suffering from acute diarrhea.

Elizabeth king recognized that there were two groups of vibrio fetus which were indistinguishable morphologically but were different in the optimum temperatures of growth. She called the group that grew best at 42°C and failed to grow at 25°C "Related vibrios" in contradistinction from the "Topical vibrio fetus" group which grew well at 25°C and 37°C but not at 42°C. She noticed that although the related vibrios were isolated from blood cultures, yet in each case the patient had a preceding diarrheal illness.

Therefore she postulated that the related vibrios might be responsible for acute diarrheal illness but should not be isolated from fecal specimens because they were slow growing and fastidious and were overgrown by coliform organisms.

In *1963, Sebald and Veron,* reported that vibrio fetus and related vibrios differed fundamentally from true vibrios in

growth and biochemical characteristics and in the DNA base composition.

Classification and Typing of Campylobacters :

Classification nd Nomenclature :

Many systems for classification of campylobacter have been proposed, but these have caused some confusion in literature. However, in an attempt to clarify the problems of nomenclature, an international agreement has been reached by the publication of the approved list of bacterial names in which the French system of classification of *Veron and Chatelain (1973)* was adopted. Again, this system is the one described in Beryey's Manual *(Simbert, 1984)*.

According to Bergey's Manual, the genus campylobacter is classified in to five species *(Simbert, 1984):*

1. **Campylobacter fetus :**
   a. Campylobacter fetus subspecies fetus: It cause sporadic abortion in sheep and cattle and cause systemic infections in man. It can grow in the intestinal tract and gall bladder of man and animals.
   b. Campylobacter fetus subspecies venerealis : It is not found in man but it causes infertility and abortion in cattle. It does not multiply in the intestinal tract of man and animals (Simbert, 1984).
2. **Campylobacter jejuni :**
   It is by far the most important member of the group as a cause of campylobacter enteritis in man. It is transmitted by feco-oral route and can grow in the intestinal tract of man and animals.
3. **Campylobacter coli :**
   It is very similar to C. jejuni in every respect. Both C. jejuni and C. coli represent the "related vibrios" of *King (1957)*.

4. **Campylobacter sputorum :**
   Which includes three subspecies :
   a. Campylobacter sputorum subspecies sputorum : It constitute part of the normal human oral flora.
   b. Campylobacter sputorum subspecies bubulus : It is non pathogenic and is found as a commensal in bovine genital tract.
   c. Campylobacter sputorum subspecies mucosalis : It is isolated from the intestinal mucosa of pigs with intestinal adenomatosis, necrotic enteritis, regional ileitis and proliferative haemorrhagic enteropathy.
5. **Campylobacter concisus :**
   It is not known to be pathogenic. It is found in the gengival margins of man with gengivitis, periodonitis *(Simbert, 1984).*

Increasing awareness of importance of campylobacter in human and animal infections has prompted workers in many laboratories to use appropriate micro-aerophilic conditions and selective isolation techniques when evaluating stool specimens. This has resulted in the increased recovery of C. jejuni and in the recognition of several new campylobacter species, including C. laridis, C. cinaedi and C. fennelliae and the thermotolerant catalase negative or weak campylobacter species, C. hypointestinalis *(Fennel et al., 1986)* which was originally isolated from the intestine of Swiné with proliferative ileitis *(Gebhart et al., 1983).*

Recently campylobacter like organism, C. pylori, formerly named campylobacter pyloridis, has been found on the mucosa of the gastric antrum in a large proportion of patient with gastritis, doudenitis and peptic ulcer *(Colee et al., 1989).*

Typing of Campylobacter Strains :

Since the recognition of campylobacter as one of the commonest causes of bacterial diarrhea in humans, different typing systems have been put forward as aids to the improved understanding of the epidemiology of the disease *(Kaijser and Sjogren, 1985).*

I. Phage typing :

A bacteriophage typing system for C. jejuni and c. coli is developed with phages isolated from poultry feces *(Grajewski et al., 1985). Bryner and his Co-workers (1982)* isolated six type-C phages from presumed lysogenic strains of C. jejuni.

Bacteriophage typing system is a reasonably simple and reproducible mean of typing of campylobacter isolates *(Grajewski et al., 1985).*

II. Phenotyping :

A. Morphological characters :

Skirrow and Benjamin (1980a) described the following morphological features for the differentiation of pathogenic campylobacters:

1. Cell size :

C. fetus organisms are generally larger than those of C. jejuni and C. coli.

2. Flagella :

C. fetus is predominantly monotrichate and organism of the C. jejuni and C. coli are amphotrichate.

3. Coccal transformation :

In post mature cultures of C. jejuni, coccoid forms are almost invariably present, but they are uncommon in culture of C. fetus.

4. Swarming ability :

This was found to be a feature only of C. jejuni and C. coli (Skirrow and Benjamin, 1980a).

B. Temperature tolerance tests :

king (1957) used this test to differentiate between C. fetus and thermophilic campylobacters. The thermotolerant campylobacter can be defined as campylobacter growing at 42°C but not at 25°C. This group includes C. jejuni, C. coli and NARTC (nalidixic acid resistant thermophilic campylobacter).

C. Ability to grow anaerobically :

C. fetus grows anaerobically in the presence of nitrate, aspartate or fumarate but C. jejuni and C. coli do not NARTC strains differ in that they are able to grow anaerobically in the presence of aspartate, fumarate and also trimethylamine-N-oxide *(Razi et al., 1981).*

D. Ability to grow in 1% glycine :

C. jejuni, C. coli and C. fetus can grow in 1% glycine, while campylobacter venerealis can not *(Veron and Chatelain, 1973).*

III. Blotyping :

A. Catalase production :

Skirrow (1977) divided campylobacter according to catalase production in two big groups.

1. Catalase negative group :

This group includes, C. sputorum with its three subspecies. Members of this group are non-pathogenic to man.

2. Catalase positive group :

This group includes, C. jejuni, C. coli and C. fetus with its two subspecies. All members of this group are pathogenic to man.

B. Hippurate hydrolysis :

C. jejuni can hydrolyze hippurate to glycine and benzoic acid, whereas C. coli donot, so this test is used to differentiate between these two species.

C. Hydrogen sulphide production in iron medium :

By the use of this test, Skirrow and Benjamin (1980b) were able to differentiate between biotypes of C. jejuni called C. jejuni biotype 1 and C. jejuni biotype 2. C. jejuni biotype 1 was negative, while C. jejuni biotype 2 was positive.

D. Antimicrobial sensitivity tests :

1. Nalidixic acid resistance :

C. jejuni and C. coli are sensitive to nalidixic acid whereas C. fetus subspecies fetus and C. laridis are resistant to it *(Collee et al., 1989).*

2. Metronidazole :

C. fetus subspecies strains are resistant to metronidazole. NARTC strains are also resistant, while there is a wide range of sensitivity among C. jejuni and C. coli strains *(Skirrow and Benjamin, 1980).*

3. Cephalothin :

All campylobacter strains are sensitive to cephalothin except C. jejuni and c. coli strains which are resistant *(Karmali et al., 1980).*