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Bacterial Infections of the Gastrointestinal Tract in Calves

Rawaa S. Jumaa

Department of Microbiology, College of Veterinary Medicine, University of Baghdad.

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Abstract: This study aimed to identify the pathogenic causes of intestinal tract in calve by isolation and identification of enteric bacteria using some biochemical tests. Bacterial examination of fecal samples selected 100 diarrheic calves aged between (1-2 years) from different area of Baghdad were carried out to determine the bacterial causes associated with diarrhea in calves. Of the 100 fecal samples examined, 78 calves affected with different bacteria. Analysis of results showed that bacterial enteropathogens of 100 calves revealed that highest percentage 54% of calves were infected with *Proteus* sp., followed by 26% were infected with *E.coli* sp., 15% were infected with *citrobacter* sp. and only 5% were infected with with *salmonella* sp. These results were indicated the presence health problem which leads to economic losses and required the necessity speed up of implanting controlling program on this disease.

Key words: Bacteria, calf, gastrointestinal tract.

Corresponding author: should be addressed (Email: Rawaa.saladdin@covm.uobaghdad.edu.iq)

Introduction

Diarrheal disease continues to be a health problem worldwide. A wide range of microbial pathogens is capable of infecting the gastrointestinal tract for humans and animals. The important bacterial pathogens cause infections of gastrointestinal tract are *Enterobactriaceae*, which include many genera (*E.coli*, *salmonella*, *proteus*, *klebsiella*, *shigella*, *citrobacter* and others). These pathogens are acquired by fecal oral rout, from focally contaminated food, fluids or fingers (1). At birth the intestine is sterile, but organisms are soon introduced with food in breast fed. The enteric bacteria establish themselves in the normal intestinal tract within a few days after birth and cause hospital acquired infections when host defenses are inadequate (1). Some enteric organisms, eg, *E.coli* is a member of the normal intestinal flora and other enteric bacteria (*proteus*, *klebsiella* and *citrobacter*) are also found as member of the normal intestinal flora but less common than *E.coli* (1). *Salmonella* are pathogenic for humans and animals; causing diarrheal disease which is the most common manifestation of infection. The essential pathologic

process is ivasion of the mucosal epithelail cells (M cell). This pathogen produces a heat labile exotoxine that acts as an enterotoxin, it produces diarrhea as does the *E.coli* verotoxin. Also *E.coli* as a predominant enteric bacterium in colon and the *Salmonella* site of predilection are gall bladder and payer patches of small intestine (2,3). *Proteus* are widely distributed in nature as saprophytes, being found in decomposing animal matter, sewage, manure soil and in human and animal feces. They are opportunistic pathogen (4). *Citrobacter* are opportunistic pathogen and part of intestinal micro flora of humans and animals. They are found in soil, water, sewage and food (5).

The study is aimed to reveal the mbacterial causes which induced diarrh ea in calves.

Materials and Methods

Sample Collection

This study was carried out to collect 100 fecal samples of calves from different area in Baghdad during (December into June since 2014). These samples were selected from calves that suffered from diarrhea at (1-2) years old and directly collected from rectum in sterile vials, transported to laboratory for examination.

Bacterial Examination

All 100fecal samples were inoculated in nutrient broth, then examined microscopically by several stains, after that cultured on several media to identified morphological characteristics, finally tested by biochemical testes, described by (6,7).

Results and Discussion

Ratio of Infected Calves with Bacterial Causes

Results of bacterial isolation revealed that (78) out to (100) samples were infected with several causes, the most prevalence was *Proteus* species (54%), followed *by E.coli* species which was (26%) and *Citrobacter* species which was (15%). While the lowest prevalence was *Salmonella* species (5%) (table 1). The highest percentage of bacteria isolated from intestinal tract was *proteus* sp. (54%)

Table 1: Bacterial species that isolated from diarrheic calves

Bacterial sp.	Number of infected calves	Percentage %
Proteus sp.	42	54
E.coli sp.	20	26
Citrobacter sp.	12	15
Salmonella sp.	4	5
Sum	78	100

Microscopic Examination

Results of microscopic examination were showed the bacterial isolated have gram negative rod, non spore forming after (18-24) hours post incubation at 37℃.

Culture Characteristic

Results showed different morphological characteristics of enteric bacteria which grow on different media (table 2).

Table 2: Culture characteristics of enteric bacteria on different bacteria

Bacteria sp.	Blood agar	MacConky agar	Salmonella Shigella agar	Eiosin methlen blue agar
Proteus sp.	γ- hemolysis swarming	yellow	/	colorless
E.coli sp.	γ- hemolysis	Pink	/	Greensh metallic sheen
Citrobacter sp.	γ- hemolysis	Light pink after 48 h.	/	colorless
Salmonella sp.	γ- hemolysis	yellow	Small, rounded colony with black center	colorless

Biochemical Identification

Results of biochemical tests for isolated bacteria in this study is shown in table (3).

Table 3: Biochemical tests for bacterial species isolated from gastrointestinal tract of calves

Bacteria sp.	SIM	Cata.	Oxi.	Ur.	TSI	Si.Ci	MR/VP	Ph.
Proteus sp.	+ - +	+	-	+	A/P H2S+ Gas+	+	+ -	+
E.coli sp.	- + +	+	-	-	A/A H2S- Gas+	-	+ -	-
Citrobacter sp.	- - +	+	-	+	A/A H2S- Gas+	+	+ -	-
Salmonella sp.	+ - +	+	-	-	A/P H2S+ Gas-	+	+ -	-

SIM:Sulfide Indole Motility, Cata.: Catalase test, Oxi.:Oxidase test, Ur.:Urease test, TSI:Triple Sugar Iron, Si.Ci:Simon Citrate test, MR/VP:Methyl Red & Voguse Proskour, Ph.:Phenelalanine test

Bacterial identification which was done in this study according to culture characteristics, microscopic examination, primary biochemical identification was matching with the characterization of these bacteria as demonstrated by Brooks (8).

At the study in 2014, (78%) of (100) fecal samples processed revealed bacterial pathogens. Of these, *Proteus* sp. was the most commonly isolated

pathogen (54%), followed by *E.coli* (26%) , *Citrobacter* (15%) and *Salmonella* (5%).

In contrast, study of Ali (9) in Kerbala province which was done on diarrheic calves, revealed that the highest proportion of pathogen was *E.coli* sp. (48%) followed by *Salmonella* sp. (12%) and *Proteus* sp. (10%). Another study in Tikrit province by Hiba (10) found that the infected pathogens which isolated from (30) calves were (16%) , (10%) and (2%) of *Salmonella*, *E.coli* and *Proteus* respectively.

Some researcher was reported (20%) *E.coli* sp. and 3% *Salmonella* sp. infection in diarrheic calves (11). Study which was done by Samad (12) suggested that the prevalence of enteropathogenic was with *E.coli* (37%) when compared with *Salmonella* (5%). A study of Luna (13) in Astria recorded a high percentage of infected pathogens in diarrheic calves was of *E.coli* (18.9%) followed by *Proteus* (1.1%). Similarly , the bacterial causes were found in diarrheic calves (14,15).

Salmonella sp. comprises the second most economically important bacterial disease affecting the gastrointestinal system, followed by *E.coli* (16).

The *Proteus* sp. are opportunistic pathogen that potentially could cause diarrhea (17).

These results may be caused due to inadequate nutrition of the pregnant dam, Mud, overcrowding, contaminated lots, calving heifers and cows together, wintering and calving in the same area, storms, cold temperatures and rainfall are all stressful to the newborn calf and increase its exposure to infectious agents. The wet and chilled (hypothermic) newborn calf experiences a loss of body heat, becomes severely stressed, and lacks the vigor to nurse aggressively and receive adequate colostrum early in life. (18).

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