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Occurrence and risk factors associated with pathogenic *E. coli* in diarrheic calves

A Thesis Presented By

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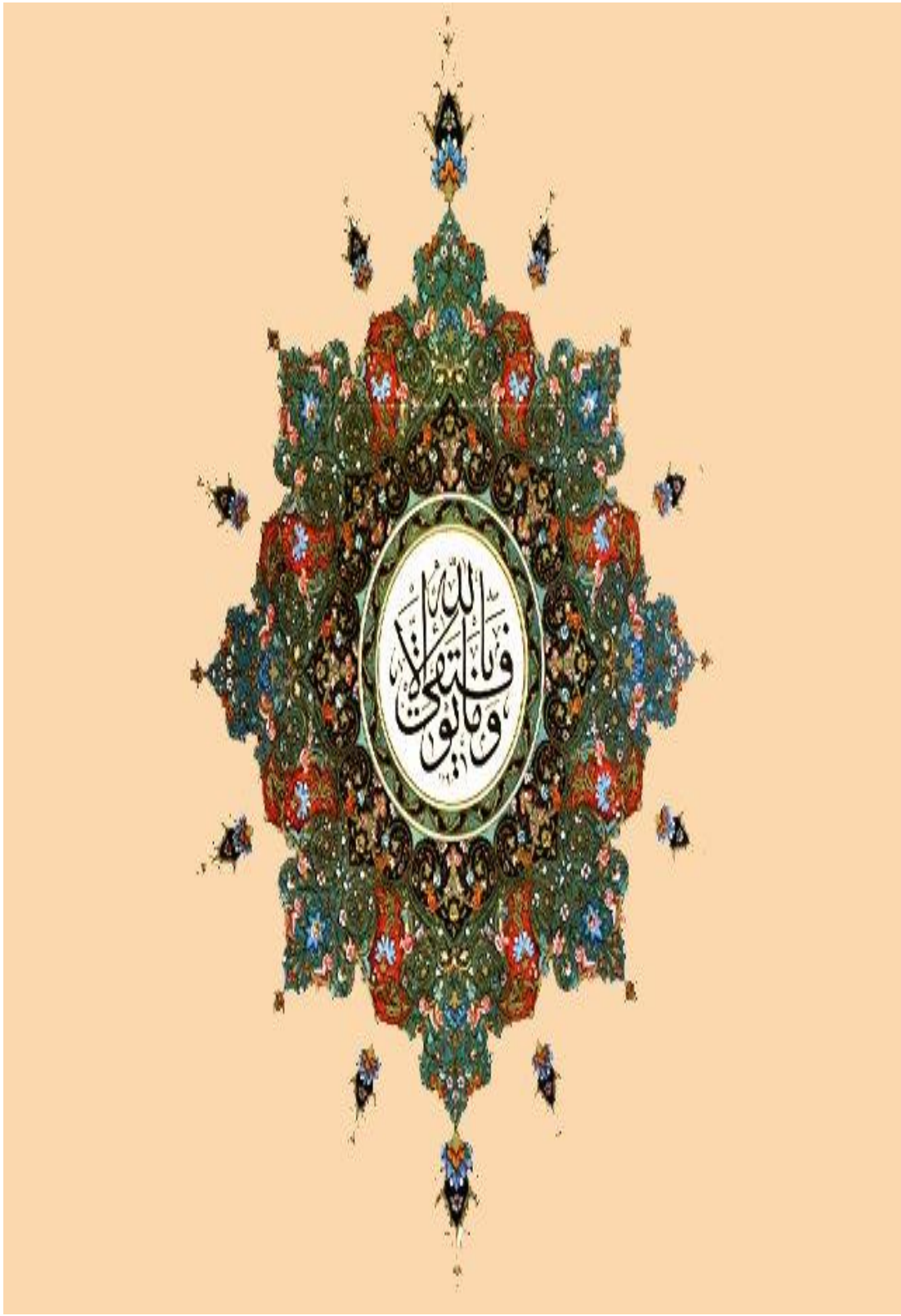
(2019)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Abstract

Bacteriological examination of fecal swabs collected from healthy (H) and diarrheic (D) calves, revealed isolation of 26 E. *coli* isolates from 56 calves with an incidence (46.4%). The serological tests for representative number of samples from every farm identified O1, O26, O44, O55, O115, O119, O125, O146, O151 and 2 samples were untyped. The isolates were sensitive to norofloxacin and gentamicin with 76.9% and resistant to Ampicillin and Cefotaxim with 100%.The PCR for 4 gene *omp*A, *stx*1, *stx*2 and *eae*A, detected *omp*A gene in all 26(100%) fecal samples, multiplies a region of 919bp, *stx*1 gene multiplies a region of 614pb in 1(3.8%) isolate, *eae*A gene was in 5 (19.2%) isolates, and no evidence for presence of *stx*2 in all 26 *E. coli* isolates. Four colostrum samples were positive for *E. coli*. The isolates were serogroups O26, O55 and O119. All isolates were negative for *eae*A, *stx*1 and *stx*2 except strain number 4 (O55) was positive for *stx*1 only.
key words: examination- isolates- gene- sensitive- serogroups.

This work is dedicated to

My mother,

My brother Ahmed,

And my love Egypt.

ACKNOWLEDGEMENT

First and foremost, I would like to thank ***Allah****, who gives me everything I have, who support me with all help and all hope, who enable me to achieve all my successes, so that all my thanks for* ***Allah.***

Then, I would like to express my gratitude for the kindness of ***Prof. Dr. Jakeen Abd El-Halem EL-Jakee****, Prof. of Microbiology, Faculty of Veterinary Medicine, Cairo University, for her valuable advices, support and valuable direction during the course of this study. My appreciation goes also to* ***Dr. Sherif Abd El-Moneim Omar****, Assistant prof. of Microbiology, Faculty of Veterinary Medicine, Cairo University.*

I wish to express my warm thanks to ***Prof. Dr. Mona Ibrahim El-Enbaawy****, professor of Microbiology Department, Faculty of Veterinary Medicine, Cairo University for her help and cooperation.*

No one can deny efforts of ***Dr. Heba Deif*** *Lecturer of Microbiology, Faculty of Veterinary Medicine, Cairo University and her help and valuable directions in differentiation of isolates by biochemical tests and Antibiotic Susceptibility test during this study.*

I wish to express my warm thanks to ***Dr. Ahmed Erfan****, PCR Unit, Animal Health Research Institute, Dokki for his help and cooperation in PCR step during this study.*

I am also deeply grateful ***my Mother and my Brother Ahmed*** *for continuous help, understanding and encouragement.*

List of Contents

Subject	Page
1-INTRODUCTION	**1-3**
2-REVIEW OF LITERATURE:	**4-37**
2.1-Emergency and economic importance of *E. coli*	**4-9**
2.2-Etiologyof calf diarrhea	**9-15**
2.3-Pathogenesis and Virulence	**16-22**
2.4-Antibiogram sensitivity test of *E. coli* Factors of *E. coli*	**22-34**
2.5-Risk factors associated with calf diarrhea	**34-37**
3.MATERIALS AND METHODS:	**38- 50**
3.1-Materials:	**38**
3.1.1-Samples:	**38**
1-Fecal samples	**38**
2-Colostrum samples	**39**
3.1.2-Media:	**39**
3.1.2.1-Media used for the isolation and identification of *E. coli*	**39**
3.1.2.2-Media used for isolation and preservation	**39**
3.1.2.3-Media used for biochemical identification of *E. coli*	**39**
3.1.2.4-Media used for Antibiogram sensitivity test of *E. coli*	**39**
3.1.3-Gram Stain.	**39**
3.1.4-Chemicals and reagents used for biochemical tests	**40**
3.1.5-Antisera were used for Serology of *E. coli* isolates	**40**
3.1.6-Antibacterial diffusion disc	**40-41**
3.1.7-Material used for extraction of DNA&PCR	**41-42**
3.1.8-Material used for agarose gel electrophoresis	**42**
3.1.9-Equipments and apparatuses used	**42**
3. 2-Methods:	**43**
3.2.1-Sampling	**43**
3.2.2-Procedure for isolation of *E. coli*	**43**
3.2.3-Identification of *E. coli* isolates.	**44**
3.2.4-Serological identification of *E. coli* isolates.	**45**
3.2.5-Antibacterial Susceptibility Testing.	**46-48**
3.2.6-Procedure of PCR.	**48-50**
3.2.7-Management of risk factors	
4.RESULTS	**51-66**
5.DISCUSSION	**67-71**
6.SUMMERY	**72**
6.REFERENCES	**73-84**
7.ARABIC SUMMERY	1-2

List of Tables

N	Title	Page
1	Number of diseased and apparently healthy samples of examined calves.	**38**
2	Diagnostic O polyvalent and monovalent antisera.	**40**
3	Oligonucleotide primers sequences	**41**
4	Antibacterial agents used.	**45**
5	Interpretation of zone of inhibition in agar diffusion method according to CLSI (2017)	**45**
6	Cycling conditions of the different primers during PCR The	**47**
7	The used questionnaire	**48-50**
8	Occurrence of *E. coli* in different farms samples	**53**
9	Serological identification of some *E. coli* isolates	**54**
10	Zone of inhibition in agar diffusion method of *E. coli* isolates	**55**
11	Interpretation of zone of inhibition in disc diffusion method as sensitive, intermediate, or resistant	**56**
12	Incidence of antimicrobial sensitivity test on *E. coli* isolates recovered from diarrheic and apparent healthy calves	**58**
13	Results of Multiplex and eaeA Uniplex PCR assays of *E. coli* isolated from healthy(H) and diarrheic(D) calves	**61**
14	Results of PCR among the colostrum isolates	**62**
15	The collected data among study area (Questionnaire).	**64-66**

List of Figures

No.	Name of Figures	Page
1	*E. coli* Gram –ve medium sized rods under microscope	**51**
2	Typical *E. coli* colonies grown on Mac Conkey agar showed lactose fermenter pink colonies	**52**
3	Results of biochemical tests of *E. coli* isolates	**53**
4	Antimicrobial sensitivity test in *E. coli* isolates	**57**
5	Agarose gel electrophoresis showing amplification of 919bp fragments for ompA gene from all *E. coli* isolates and amplification of 614 bp fragments for stx1 gene among strain number 2 isolated from apparently healthy calf from farm number1 in comparison with DNA marker (QIAGEN).	**59**
6	Agarose gel electrophoresis showing amplification of 248bp fragments for eaeA gene among strain number 2 isolated from apparently healthy calf from farm number1 and strains number 4 and 7 isolated from diarrheic calves from farm number 3 and strains number 8 and 14 isolated from diarrheic calves from farm number 3 in comparison with DNA marker (QIAGEN).	**60**
7	Result of *eae*A gene (a) and ompA, *stx*1 &2 genes (b) among the colostrum isolates.	**62**

List of Abbreviations

AM	Ampicillin
AEEC	Attaching and effacing *E. coli*
BPW	Buffer peptone water
°C	Degree Centigrade
Cm	Centimeter
CTX	Cefotaxime
CN	Gentamicin
DN	Clindamycin
*eae*A	Gene coding for ttaching and effacing mechanism
EHEC	Enterohemorrhagic *E. coli*
ehly	Gene coding for hemolytic mechanisms
EIEC	Enteroinvasive *E. coli*
EPEC	Enteropathogenic *E. coli*
ETEC	Enterotoxigenic *E. coli*
(H)	Flagller Antigen
H2S	Hydrogen sulphide
*inv*A	Invasion gene A
K	Kanamycin
min.	Minute
MKTN	Muller Kauffmann Tetrathionate Novobiocin broth
N.	Number
NCD	Neonatal calf diarrhea
NOR	Norofloxacin
(O)	Somatic Antigen
PCR	Polymerase chain reaction
RVS	Rappaport-Vassiliadis Soya broth
SG	*Salmonella* Gallinarum
SMT	Standard microbiological technique
STEC	Shiga toxin-Producing *E. coli*
Stx	Shiga toxin
SXT	Sulphonamid-trimethoprim
TBE	Tis borate EDTA
TSA	Trypton soya agar
TSI	Triple sugar iron agar
XLD	Xylose Lysine Desoxycholate
TSI	Triple sugar iron agar
XLD	Xylose Lysine Desoxycholate

Chapter1

Introduction

1- INTRODUCTION

Neonatal calf diarrhoea (NCD) is one of the major health challenges in both beef and dairy cattle herds **(USDA, 2010)**. The prevalence and incidence risk for NCD has recently been reported to be 19.1 and 21.2%, respectively **(Bartels *et al*., 2010; Windeyer *et al*., 2014)**.

In USA, diarrhoea in neonatal calves accounts for more than 50% of unweaned dairy heifer deaths **(USDA, 2010)**. The herd veterinarian is the most adequate person to advice farmers how to treat and how to prevent NCD **(Smith, 2012).**

However, calf diarrhea was perceived as a minor problem by dairy producers, while the beef producers did not consider it a problem at all **(Roderick and Hovi, 1999).**

Diarrhoea in neonatal calves is a complex multifactorial and dynamic disease with the balance between the host's resistance (i.e. active and passive immunity) and the pathogen pressure being cardinal **(Lorenz *et al*., 2011).** Enterotoxic *Escherichia coli*, rota- and coronavirus and *Cryptosporidium parvum* are the four most important enteropathogens causing NCD world wide **(Gulliksen *et al*., 2009; Bartels *et al.* 2010; Silverlas *et al*., 2010)**. Rota virus and *Cryptosporidium parvum* are most frequently identified in faecal samples from calves with NCD:

prevalenc in calves with diarrhoea ranges from 2.6 to 45.1%, 17.7 to 79.7%, 3.1 to 21.6% and 27.8 to 58.5%, for *E. coli*, rota- and coronavirus and *Cryptosporidium parvum* respectively **(Geurden *et al*., 2008; Ok *et al*., 2009; Bartels *et al.*, 2010; lzzo *et al*. 2011)**. The simultaneous or consecutive presence of more than one than one of these pathogens often causes an increased morbidity and mortality rate **(Blanchard, 2012).**

Each strategy to prevent NCD should begin with a confirmed diagnosis and the setup of a farm interview. The herd anamnesis addressing young stock management creates a list with potential critical control points. Key questions in this anamnesis should focus on: colostrum management, housing and hygiene, feeding of the calves, periods of stress, and drug used **(Blanchard, 2012; Smith, 2012)**.

Generally, calf diarrhea resulted from complex interaction of environment, infectious agents and the calf itself are the major constraints for raising replacement stock. The impacts of calf diseases could be direct and indirect through increased treatment expenses, decreased lifetime productivity and survivorship **(Randhawa et al., 2012)**.

Escherichia coli first described by a Bavarian Paediatrician, Theodor Escherich, in the late 19th century in a series of pioneering studies of the intestinal flora of infants he describe a normal microbial inhabitant of healthy individuals **(Kaper, 2005)**

The present investigation was aimed to study the risk factors associated with *E. coli* among diarrheic and apparent healthy calves.

Therefore, the following steps were carried out:

1-Collection of fecal samples from calves with and without diarrhea.

2-Trials for isolation and identification of *E. coli*.

3-Serotyping of the isolates.

4-Antimicrobial susceptibility testing of the isolates.

5-Measurment of virulence factors among the isolates.

6-Investigation of risk factors associated with calf diarrhea.