Some bacteriological and clinicopathological studies on calves suffering from enteritis

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Abstract
A survey was carried out on 50- cow calves of both sexes aged from (1 week to 5 months) belonging to a private Farms at Ismailia Governorate. Out of these animals 40 (90%) were suffering from diarrhea with gradual weight loss and varying degrees of dehydrations. Ten apparently healthy calves were selected and served as a control group. Fecal samples were collected from diseased and control calves for determination of the associated bacterial agents.
The bacteriological investigation revealed that the isolation of (20) *E. coli* isolate's which serologically typed as (O157, O115and O119) in an incidence of (4, 8and 8) respectively, 25 isolates were *salmonella* and serologically typed as *S. typhimurium* (15) and *S. enterica* (10) and finally (10) isolates were identified as *Proteus vulgarius*.
Ciprofloxacin, Enrofloxacin and Gentamycin were the most effective antimicrobials agent against enteric bacteria in this study.
The hematological findings in all diarrheic calves showed a significant increase in hemoglobin content (Hb), packed cell volume (PCV %), total erythrocytic counts (RBCs) and total leucocytic count. Biochemically, examination of serum samples revealed that, a significant decrease of total protein, albumin, globulin, Gamma-globulins, immunoglobulin A, immunoglobulin G, and immunoglobulin M sodium, calcium, magnesium, copper, zinc and glucose. On the other hand, a significant increase was recorded in serum potassium, chloride, inorganic phosphorous, urea nitrogen, creatinine and liver enzymatic activities of S. AST and S. ALT.
The diarrheic calves were treated with a combination of oral and parenteral electrolytes to correct dehydration together with antibiotic to control concurrent bacterial infection. Nearly the disturbed hematological and serum biochemical parameters showed improvements towards their normal levels with the disappearance of the clinical signs of the diseased animals after treatment.

Key words:
Bacteriological, clinicopathological, enteritis, Alpha and Gamma-globulins, calves.

Introduction

Calf diarrhea is one of the most commonly encountered disease syndrome and is the significant cause of economic losses in dairy industry. Economic losses associated with the disease include decreased performance, high morbidity and mortality and the expenses of medication and labor to treat the sick calves. The effectiveness of treatment and control of herd epidemics of diarrhea in calves is frustrating and causes heavy economic losses. Immunobiochemical alterations in diarrhea are complex in nature. A good immuno-biochemical diagnostic workup is important for successful treat-

ment and preventive measures **(Sharma *et al.*, 2013).**

Diarrhea in calves can be caused by a variety of pathogens including bacteria, viruses, protozoa and intestinal parasites. Among bacteria, enterotoxigenic *Escherichia coli* (ETEC) and *Salmonella* are known to be the most common and economically important agents **(House, 1978).** A large number of infectious agents have been incriminated as causes of neonatal calf diarrhea (NCD), including *Salmonella* and bovine viral diarrhea virus (BVDV). Commonly reported causative pathogens are rotavirus, coronavirus, Cryptosporidium spp. and enteropathogenic *Escherichia coli* (*E. coli*) **(Tzipori, 1981; Tzipori, 1985; Snodgrass *et al.*, 1986 and Gulliksen *et al.*, 2009).** *Escherichia coli* is one of the most important causative agents of diarrhea in newborn calves **(Güler, *et al.*, 2008 and Nguyen *et al.*, 2011).** Because *E. coli* is a normal inhabitant of the gastrointestinal tract of animals, differentiation of pathogenic strains from normal flora is based on identification of virulence characteristics **(Güler *et al.*, 2008).** Bovine salmonellosis is caused mostly by two of them, *Salmonella* enterica serovar Typhimurium (*S. typhimurium*) and serovar Dublin (*S. dublin*). **(Hughes *et al.*, 1971 and Sojka and Wray, 1975).** *S. typhimurium* is the serotype most frequently isolated from ill cattle in the USA, thereby resulting in significant economic losses **(Wells *et al.*, 1998).** *S. typhimurium* affects mostly young cattle and may cause various clinical manifestations that can range from a peracute course with death within 24 hours of infection to a chronic asymptomatic infection. However, the most common clinical manifestation of the infection is an acute diarrheal disease **(Cirillo *et al.*, 1998).** Cattle are a useful model for *Salmonella*-induced diarrhea in humans because the clinical manifestation of the infection is similar in both species **(Tsolis *et al.*, 1999).**

Diarrheic calves showed the general significant elevation in haematological parameters as Haemoglobin (Hb), packed cell volume (PCV) and total erythrocyte counts (TEC) due to haemoconcentration are always associated with dehydration **(Schalm *et al.*, 1975).** Diarrheic calves are found to have biochemical alterations such as hypoglycemia **(Fettman *et al.*, 1986).** Immunoglobulin is acquired by the offspring through the agency of colostrum. In colostrum, immunoglobulin present are IgG1, IgM, IgA and IgG2, however, IgG1 is predominant representing 80 per cent of the total immunoglobulin absorbed by the neonatal calf **(Blom, 1982).** The amount of antibodies from individual females shows differences due to breed, nutritional status and parity. Season, geography, and sex is also known to influence passive transfer of colostral immunoglobulin's in calves **(Sangwan *et al.*, 1985).**

This work aimed to study some bacteriological etiological agents of diarrhea in cow calves in addition to hematological, biochemical and immunological changes.

Materials and methods

1- Animals (calves).

50- cattle calves of both sexes aged from (1 week to 5 months) belonging to a private Farms at Ismailia Governorate, suffering from diarrhea were used in this study. Out of these animals 40 were suffering from diarrhea with gradual weight loss and varying degrees of dehydrations and 10 apparently healthy calves were selected and served as control group.

II. Samples and adapted methods. Samples were taken from both healthy, diseased non treated and treated cases as follow:

Fecal Samples. Fecal samples were taken aseptically from diarrheic calves for bacteriological examination using sterile swabs.

Blood Samples. Two blood samples were collected from each animal through jugular vein puncture. Anticoagulant one for hematological examination and the other separated serum for biochemical assay according to **(Jain, 2000)**.

III- Diagnostic Procedures.

(a) Clinical examination: All animals under study were subjected to clinical examination.

(b) Laboratory diagnosis:

1- Bacteriological examination:

Isolation and identification of Enterobacteriaceae was carried out on the basis of **(Quinn *et al.*, 1994)**. All swabs streaked directly onto three specific selected solid media (MacConkey agar, Brilliant green, XLD and Salmonella and Shigella (S&S) agar plates) and incubated overnight at 37 °C. At the same time, *Salmonellae* spp. were detected by culturing fecal sample on Selenite "F" broth and incubated at 37°C for 18 hours. Then subculture was done on MacConkey's agar, Brilliant green, XLD and S&S agar plates and incubated overnight at 37°C. Identification of different isolates mainly on the basis of cultural morphological and biochemical reactions.

B) Serological typing of the *E. coli* isolates by using polyvalent (O) antisera was carried according to **(Edwards and Ewing, 1972)** in Animal Health Research Institute in Dokki**.** Sero-diagnosis for salmonella by using polyvalent (O) antisera Kit (Dade Behring Marburg GmbH –USA) D-35001 in animal health research institute, serology department in Dokki.

C) Antibacterial studies:

a) Antimicrobial sensitivity test of the isolated bacteria was done onto Mueller–Hinton medium (Oxoid) according to **NCCLS (2002)** by using: Different chemotherapeutic sensitivity discs (O**xoid)** namely Cefotaxim (CTX - 30 µg), Ciprofloxacin (Cip-5µg), Enrofloxacin (Enr-10µg), Gentamycin (Cn-10µg), Doxycycline (Do- 100 µg), Chloramphenicol (C – 10 µg), Streptomycin (S - 10 µg), Erythromycin (E - 15 µg), and Trimethoprim/ Sulphamethoxazol (SXT-30 µg) were used.

b) Field Treatment: A jugular vein catheter was introduced and a continuous drip infusion of physiologic saline (0.9%) was connected.

Multivitamin (Norbrook co.) IM injected once (5ml).

Diacure plus (Boringer Igelhime co.) powder oral supply 50gm twice daily for 3 days .

Marbocyle 10% (intercova company) 2ml by IV for 3 days.

In severely dehydrated calves it should be used with caution as is has a nephrotoxic potential as Cobactan 2.5%. **(Kaske & Kunz, 2003; Apifarma, 2007 and MSD Animal Health. Intervet International B. V., 2009).**

Metacam® from boringer ingelhime co. (anti-inflammatory) (2ml by intravenous rout) is considered to be beneficial in the improvement of the calves' health.

NB.* Diacure® is a compound containing loperamide, an antidiarrheic drug which acts by decreasing the peristaltic motility and increasing the absorptive activity of the intestine **(Drugs. com. Drug Information Online, 2011).**

*Marbocyl® contains marbofloxacin and is a broad spectrum antibiotic with a similar action to Enrofloxacin **(Apifarma, 2007; Tierarzneimittel Kompendium der Schweiz. Clinipharm Clinitox , 2008).**

2-Haematological Procedures: Determination of total erythrocytic count, haemoglobin concentration, packed cell volume and total leucocytic count were determined according to **Jain (2000**).

3-Biochemical Studies: Biochemical serum analysis**:** The concentrations of sodium, potassium, chloride, calcium, inorganic phosphorus, copper, magnesium, zinc, urea, creatinine, glucose, total protein, albumin, globulin, and the activities of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were all assayed by an automatic analyzer Hitachi 912 in hospital Suez canal university.

4-Immunological studies:

Protein electrophoresis was done using SDS-Polyacry-lamide gel electrophoresis according to **(Laemmli, 1970)** in animal health research institute in biochemistry department. Serum samples were calorimetrically analyzed using test kits (Bicon – Germany and SGM – Italian) for measuring immunoglobulin (IgM, IgG and IgA) in Suez Canal University Hospital**.**

IV- Statistical analysis. The data were statistically analyzed according to **(Nedcor and Cochran, 1982).**

Results

The clinical signs observed on calves in this study were depression, weakness, decrease milk suckling, weight loss and intermittent diarrhea where, various degrees of diarrhea were

noticed during clinical investigation of diarrheic calves were profuse in some cases, watery and yellow in colour. In others, feces were offensive, semifluid watery, yellowish, containing mucous and sometimes tinged with flood.

All the fecal samples collected were processed for the isolation and identification *E. coli* with standard protocol**.** Bacteriological examination of fecal samples showed that the (20) diarrheic calves were positive for *E. coli* (50%), and 10 cases were positive for isolates *Salmonella* (25%) and *proteus vulgaries* (25%). Serotyping of *E.coli* results as O115, O119 and O157 with percentage of 20%, 20% and 10% respectively. On the other hand serotyping *salmonella* isolates showed that (6) isolates were s*almonella typimiurium* and (4) isolates were *salmonella enterica* in an incidence of 12% and 10% respectively.

The results of the in vitro antibiogram test were summarized in Table (2).

All the information of hematological parameters were collected has been compiled in Table (3). The hematological findings in all diarrheic calves showed significant increase in Hb conc., PCV, R.B.Cs counts and total leucocytic count. In table (4) observed significant increase in ALT, AST, Urea and Creatinine. Also, there is a significant decrease in serum glucose level of all diarrheic calves. There were hypoprotienemia and hypoalbuminemia accompanied with hypoglobulinemia as well as significant decrease in immunoglobulin G, immunoglobulin M and immunoglobulin A in diarrheic calves (table, 5). Serum electrolytes showed significant decrease of sodium, calcium, magnesium, copper, zinc in all diarrheic calves in table (6). On the other hand, a significant increase was recorded in serum potassium, chlorides and inorganic phosphorous. While, non-significant changes in blood analysis in treated group when compared with diseased calved and improvement in immunity observed in no changes in immunoglobulin.

Table(1). Incidence of bacterial causes of diarrhea in calves.

Etiological microorganism	Diarrheic calves 40		Apparently healthy 10		Total 50	
	Number	%	Number	%	Number	%
Total *Escherichia coli* O115 O119 O157	8 8 4	20 20 10	3 untypable	30	23	46
Salmonella typhimirium	6	15	2	20	12	24
Salmonella enterica	4	10	--	--	4	8
Proteus vulgaries	10	25	1	10	11	22
Total	40	100	6	60	50	100

Table (2). Sensitivity of the isolated *Salmonella , E.coli and proteus* to different antimicrobial agents

Antibiotic disc / Microorganisms	CTX	CIP	Enr	Cn	DO	C	S	E	SXT
Escherichia coli O115	R	S	S	S	S	S	I	I	R
Escherichia coli O119	R	S	S	S	S	S	I	I	R
Escherichia coli O157	R	S	S	S	S	S	I	I	R
Salmonella typhimurium	S	S	S	S	R	R	R	R	R
Salmonella enterica	S	S	S	S	R	R	R	R	R
Proteus vulgaries	I	S	S	S	R	S	I	R	R

Abbreviations:
CTX: Cefotaxim, Cip: Ciprofloxacin, Enr: Enrofloxacin, CN: Gentamycin,
Do: Doxycycline, C: Chloramphenicol, E. Erythromycin, S: Streptomycin,
SXT: Trimethoprim, ***R= resistance,*** ***S = sensitive***

Table (3). Mean values of Hemogram picture in clinically healthy and diarrheic calves

Conditions / Parameters	Healthy calves (Control)	Diarrheic calves	Treated calves
Hb (gm /dl)	11.6 ± 1 .31	12.14 ± 0.47*	11.8 ±0.4
R.B.Cs (10^6 /µl)	6.5 ± 0.2	7.6 ± 0.1 *	6.3±0.1
P.C.V (%)	30.2 ± 0.5	34.2 ± 0.4**	31.1± 0.3
W.B.Cs (10^3 /µl)	7.41 ± 0.2	10.1 ± 0.1 **	7.7±0.2
N eutrophiles%	33.5 ± 0.2	40.2 ±2.3**	34.1± 0.5
Lymphocytes %	60.3 ± 0.5	47.5 ± 1.2**	59.4± 0.4
Monocytes%	3.2 ± 0.03	4.3 ± 0.5*	3.5± 0.2
Eosinophils%	1.2 ± 0.3	2.5 ± 0.3**	1.4±0.2

* Significant at (P < 0.05). ** Highly significant at (P < 0.01).

Table (4). Mean values of blood serum parameters of liver and kidney functions in clinically healthy and diarrheic calves.

Conditions / Parameters	Apparently healthy calves (Control)	Diarrheic calves	Treated calves
ALT (Ul/ml)	27.3 ± 0.5	52.6 ± 1.3U**	28.5 ± 0.6
AST (Ul/ml)	30.5 ± 1.3	66.5 ± 1.5**	32.3 ±1.1
Urea (MG/DL)	17.2 ± 0.4	27.6 ± 0.7**	18.3 ± 0.3
Creatinine	0.92 ± 0.05	2.1 ± 0.06**	1.2 ± 0.04
Glucose mg /dl	39.89 ± 3.30	35.45 ± 1.14 *	40.5 ± 1.4

* Significant at (P < 0.05). ** Highly significant at (P < 0.01).

Table(5). Proteinogram and immunoglobulin parameters between clinically healthy and diarrheic calves.

Conditions / Parameters	Apparently healthy calves (Control)	Diarrheic calves	Treated calves
Total protein gm /dl	8.28 ± 0.14	6.1 ± 0.12**	7.8 ± 0.11
Albumin gm /dl	4.92 ± 0.77	3.3 ± 1.24**	4.6 ± 0.5
Globulin gm /dl	3.36 ± 0.78	2.8 ± 1.24 *	3.2 ± 0.6
Alpha – globulin %	21.61 ± 0.58	21.87 ± 0.47	21.5 ± 0.55
Beta – globulin %	13.47 ± 1.04	12.98 ± 0.84	13.5 ± 0.75
Gamma– globulin %	29.40 ± 0.95	26.04 ± 0.75*	28.5 ± 0.8
IgG (mg/ml)	181.6±1.74	148.0±1.82**	180.5 ± 1.4
IgM (mg/ml)	51.60±0.02	40.70±0.01&**	50.0 ± 0.2
IgA (mg/ml)	7.2 ± 0.3	6.5 ± 0.5	6.9 ± 0.2

* Significant at (P < 0.05). ** Highly significant at (P < 0.01).

Table (6). Mean values of some elements in blood serum of calves with healthy and diarrheic calves.

Conditions / Parameters	Apparently healthy calves (Control)	Diarrheic calves	Treated calves
Sodium (mmol/L)	144.3 ± 1.38	130.14 ± 3.1 **	141.4 ±1.02
Potassium(mmol /L)	4.29 ± 0.18	6.58 ± 0.16**	5.1±0.2
Chloride(mmol/L)	109.0 ± 1.12	149.5 ± 1.05 **	108.5 ± 1.1
Calcium (mg /dl)	11.3 ± 0.25	9.9 ± 0.30**	10.8 ± 0.2
Inorg. Phosphorus(mg /dl)	6.45 ± 0.20	8.1 ± 0.62**	7.1±0.3
Magnesium (mg /dl)	3.1 ± 0.04	2.2 ± 0.02*	2.9 ± 0.01
Copper (mg /dl)	0.52 ± 0.01	0.31 ± 0.01**	0.48 ± 0.01
Zinc (mg /dl)	1.3 ± 0.03	0.6 ± 0.1*	1.1 ± 0.02

* Significant at (P < 0.05). ** Highly significant at (P < 0.01).

Discussion

Various etiological agents were isolated from diarrheic calves during early age. The etiological agent of physiological conditions as age, breed, sex, stress, nutritional status and treatment always affects mortality **(Kumar *et al.*, 2012 a, b).**

The clinical signs observed on calves in this study were depression, weakness, decrease milk suckling, weight loss and intermittent diarrhea where, various degrees of diarrhea were noticed during clinical investigation of diarrheic calves were profuse in some cases, watery and yellow in colour. In others, feces were offensive, semi fluid watery, yellowish, containing mucous and sometimes tinged with flood. Similar results were recorded by **(Ghanem *et al.*, 2012 and Malik *et al.*, 2013).** Bacteriological examination of fecal samples showed that the (20) enteric calves harbor *E. coli* (50%), (10) harbor *Salmonella* (25%) and (10) harbor *proteus vulgaries* (25%). These results nearly agreed with **(Osama *et al.*, 2000).** These findings indicated the high percentage of *E. coli* in diarrheic calves as suggested by **(Malik *et al.*, 2012; Ghanem *et al.*,**

2012 and Malik *et al.,* 2013). Also, these indicates that *E.coli* was established as a part of the normal intestinal flora and calves when exposed to stress factors it become pathogenic mixed infection as *salmonella* and *proteus* and these results were agreed with **(Osama *et al.,* 2000 and Ghanem *et al.,* 2012)** who reported that the fecal samples collected from calves suffering from diarrhea showed higher incidence of *Salmonella* (17.5%) than contact apparently healthy calves (3.4%).

Serotyping of *E.coli* isolates were identified as O115, O119 and O157 with percentage of 20%, 20% and 10% respectively. These results were nearly agreed with **(Liu *et al.,* 2010)** who reported that *Escherichia coli* strains belonging to serogroups O8, O9, O15, O26, O35, O78, O86, O101, O115 and O119 are commonly associated with septicemia or diarrhea in calves and pose a significant threat to the cattle industry worldwide. Also, these results nearly were agreed with **(Osman *et al.,* 2013)** who isolated The *E.coli* from diarrheic calves and small ruminants which belonged to seven O serogroups (O25, O78, O86, O119, O158, O164 and O157).

On the other hand serotyping *salmonella* isolates identified as *salmonella typimiurium* in percentage of 12% and *salmonella enterica* 10% . These results were agreed with **(Ahmed *et al.,* 2009)** who isolated nine unique Salmonella isolates were obtained from 220 fecal samples in Egypt and Four serotyped were *Salmonella enterica* serovar Typhimurium and two were *S. enterica* serovar Enteritidis.

The antibiogram profile of different bacterial isolates indicated that Ciprofloxacin, Enrofloxacin and Gentamycin proved to be the most effective antimicrobials against enteritis causing bacteria in the study and Cefotaxim more sensitive for *E.coli* serotyped. **Scaria *et al.,* (2013)** all the strains (E.coli and Salmonella) were susceptible to amikacin, ciprofloxacin and nalidixic acid. These results were nearly agreed with **(Orden *et al.,* 2011)** who stated that *E.coli* more sensitive to Cefotaxim. **Orden *et al.,* (2000)** reported that The *E. coli* strains were very susceptible (89-95%) to apramycin and gentamicin while a high level of resistance (from 23 to 50%) to ampicillin, neomycin, kanamycin, spectinomycin, chloramphenicol, sulphadimethoxine and trimethoprim was also detected. All the *E. coli* and *Salmonella* strains were resistant to streptomycin. 95% of the strains were resistant to tetracycline.

Regarding to the blood cellular constituents of the diseased groups (table, 3), there were significant increase in RBCs count, Hb concentration and PCV value. There were also neutrophilia, leucocytosis, eosinophilia and monocytosis. These results were in agreement with that obtained by **(Osama *et al.,* 2000 and Malik *et al.,* 2013).** The polycythemia in our results may be attributed to decreased volume which lead to hypovolaemia, hemoconcenteration and relative polycythemia **(Osama *et al.,* 2000).** Leukocytosis, neutrophilia, eosinophilia and monocytosis may be attributed inflammatory mechanism of the causative agents as well as hemoconcenteration **(Osama *et al.,* 2000).** The marked neutrophilic response with lymphopenia is characteristic of acute bacterial enteritis **(Malik *et al.,* 2013).** In treated groups by Marbocyle showed improvement of the hematological parameters in diseased calves and return to the normal level.

As regarded to enzymatic activity in enteric calves we found that significant increase in ALT and AST levels. These results were agreed with **(Ghanem *et al.,* 2012).** These changes may be attributed to hepatic degenerative and necrotic changes due to bacterial infection and toxin **(Kanekro 1996).** The biochemical analysis of kidney function was recorded a significant increase in the level of urea and creatinine in enteric calves. These results were agreed with **(Ghanem *et al.,* 2012)** who attributed these results to dehydration and metabolic dysfunction among diseased calves. **Coles (1986)** attributed these results to excessive protein catabolism and present azotaemia. There is a significant decrease in serum glucose level of all diarrheic calves. This finding result agreed with the previously reported by **(Coles, 1986 and El-Sangary *et al.,* 2004)**

who postulated other factors causing hypoglycemia as anorexia, decreased intestinal glucose absorption, a low level of glucose reserves in young age and alterations in tissue metabolism caused by decreased blood flow and oxygenation associated with the hypovolemic shock which present in the hypoglycemic diarrheic animals.

The electrophoretic pattern of serum protein of diarrheic calves (Tables, 5) showed decrease in total albumin and gamma globulins of all diarrheic calves. Our results agreed with **(Osama *et al.,* 2000 and Ghanem *et al.,* 2012).** In the present study reported significant decrease in IgG and IgM. These results were agreed with **(Sharma *et al.,* 2013)** who reported that significant decrease in the serum IgG and serum IgM values in colibacillosis affected diarrheic calves. There was association of colibacillosis with the deficiency of plasma immunoglobulins. The risk of development of infectious diseases was greater in calves in which there had been failure of passive transfer of maternal immunoglobulin. Thus colostrum feeding may reduce the risk of diarrhea in neonatal calves **(Sharma *et al.,* 2013).** Treatment of diseased calves with Marbocyle showed non-significant changes in serum biochemical parameters.

The present study revealed significant reduction of Na values in diarrheic calves (Table 6). These findings were in agreement with observations of **(Bijwal *et al.,* 1985 and Sridhar *et al.,* 1988). Aly *et al.,* (1996); Dubey and Rao (1997) and Malik *et al.,* (2013)** who reported hyponatreamia in diarrheic calves due to an excessive secretion of sodium along with water into intestinal lumen. These findings were contrary to that of **(Kaur *et al.,* 2006),** who recorded hypernatremia in diarrheic calves as compared to healthy calves. The present study revealed elevation of potassium levels in all the diarrheic calves. (Hyperkalaemia was due to increased potassium retention by kidney and also due to cellular damage **(Fisher *et al.,* 1983).** Similar observations have been reported by other workers such as **(Sridhar *et al.,* 1988 and Kaur *et al.,* 2006).** Serum chloride values of diarrheic calves showed elevation of chloride values in diarrheic calves (Table 6). These findings were similar to observations of **(Sridhar *et al.,* 1988).** They reported hyperchloraemia in scouring calves, it might be due to liver dysfunction leading to an increase in capillary permeability with the loss of colloidal protein into tissue and resulting increased serum chloride. **Gross (1988)** reported metabolic acidosis resulting due to the excess of H+ and deficit of NaHCO3, in the pathogenesis of this condition, due to overproduction of H+ and Cl- released from the RBCs to maintained the electro neutrality and to cope with the loss to anion (HCO3-) and the results eventually in hyperchloraemia. **El-Sangary *et al.,* (2004)** who recorded significant hyponateremia, hypochloremia, hypomagnesemia and hyperkalemia in diarrheic calves Decreased serum concentrations of glucose, sodium and chloride are common findings in diarrheic calves **(Koch, 2004 and Berchtold, 2009). Coles (1986) and Duncan *et al.,* (1994)** attributed the decrease in serum calcium level to hypoalbumineamia where decreased albumin concentration lowers the total calcium level, while both ionized and complex calcium levels remain normal. Also, there was decrease level of zn and copper in enteric calves. This result may be attributed due to inflammatory infections **(Spain, 1993). Kaneko (1989)** found that the loss of appetite and loss of blood are the main general causes of these trace elements deficiency which accompany bacterial infection. Also, **(Ghanem *et al.,* 2013)** found the strong negative correlation between the degree of diarrhea
and the levels of Cu, Zn and Fe, respectively. Treatment of diseased calves with a electrolytes correct dehydration and showed non-significant changes in serum trace elements.

In conclusion, it is obvious that diarrhea as a clinical sign of major importance, Enterobacteriaceae especially *E. coli* infection and *salmonella* must be considered in diarrheic calves where they cause hematological and biochemical alterations. So, attention to the management factors and the nutrition of the pregnant cattle to ensure adequate colostral production and to the care of young calves to ensure adequate

colostral intake will help in the minimization of these infections. Moreover, an adequate knowledge of the background of disease and the application of appropriate preventive programs at right time, occurrence of diarrhea in the flock can be virtually eliminated. However, hematological and biochemical evaluations are regarded as fine monitors of health and disease conditions. Their estimations at regular intervals reflect either regression or progression of respective disease condition.

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بعض الدراسات البكتيريولوجية والباثولوجيه الإكلينيكية على العجول المصابة بنزلات معويه

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الملخص العربى

تم عمل مسح لعدد 50 عجل تتراوح أعمارها من (اسبوع الى 5 شهور) فى مزارع خاصة فى محافظة الاسماعيلية وكان من بين هذه العجول 40 عجل مريض بالإسهال المستمر مع نقص الوزن والجفاف تم عزلها كمجموعة مريضة وكذلك تم عزل 10 عجول سليمة ظاهرياً استخدمت كمجموعة ضابطه بهدف المقارنة. تم جمع عينات براز من العجول المريضة والسليمة الضابطة لتجديد المسببات البكتيرية.

ويهدف هذا العمل الى دراسة بغض العوامل البكتيرية المسببة للاسهال والتغيرات الدموية والبيوكيميائية في العجول المريضة . وتشمل الدراسة على هيموجلوبين الدم وكرات الدم الحمراء والبيضاء والهيماتوكريت . وتمت الدراسة على سيرم الدم لتحديد نسبة الكالسيوم والفوسفور الغير عضوى والماغتسيوم والجلوكوز والبروتين الكلي بالاضافة الى الفا وبيتا والجاما حلوبيولين بالفصل الكهربائي. وكشفت النتائج البكترية الى 50% من اى كولاى (O115.O119,O157) و 25% سالمونيلا و25% بروتيس فلجاريس من العجول المصابة وأظهرت الدراسات الدموية عن حدوث زيادة معنوية فى عدد كرات الدم الحمراء وكمية الهيموجلوبين وحجم خلايا الدم المضغوطة وعدد كرات الدم البيضاء مما يوضح أن هذه العجول تعانى من الجفاف الشديد. بالنسبة للتحليل البيوكيميائى لمصل الدم فكان هناك نقصا معنويا فى مستوى كل من البروتين الكلي، والالبيومين والجلوبيولين والجاما جبلوبيولين والامينوجلوبيولين Gو AوM والصوديوم والكالسيوم، والمغنيسيوم والنحاس والزنك والجلوكوز. وعلى العكس من ذلك كانت زيادة معنوية فى مستوى كل من البوتاسيوم والكلوريد و الفوسفات الغير عضوية واليوريا نيتروجين والكرياتينين والنشاط الإنزيمي للكبد مثل الأسبرتيت أمينوترانسفيريز- الآلانين أمينوترانس فيريز. ولقد تم علاج العجول المريضة بالإسهال باستعمال محاليل تعالج الجفاف مع المضادات الحيوية لمكافحة العدوى البكتيرية المزمنة. وكانت نتائج العلاج جيدة حيث تحسنت قياسات الدم الدموية والبيوكيميائية إلى مستواها الطبيعى مع اختفاء الأعراض الإكلينيكية للحيوانات المريضة بعد العلاج.