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# ROLE OF ENTERIC PATHOGENS IN ENTERITIS IN LAMBS, GOAT KIDS AND CHILDREN AND THEIR ZOONOTIC IMPORTANCE

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## SUMMARY

This study was carried out to investigate the role of some enteric pathogens in enteritis in lambs, goat kids and childrens. For this purpose, 470 (310 diarrhoeic and 160 non-diarrhoeic) lambs and goat kids (aged from 1 to 45 days) of four herds in Sharkia and Dakahlyia provinces were investigated. In addition, 130 (80 diarrhoeic and 50 non-diarrhoeic) children (45 shephreds of four herds and 85 household children living with shepherds) were examined. The investigation included virological examination for Rota and Corona viruses, bacteriological examination for *Escherichia coli* and *Salmonella* and parasitological examination for *Cryptosporidium*.

The clinical signs of diseased animals and post-mortem findings of dead ones were recorded. The morbidly and mortality rates were 65.9% and 13.5%, respectively. *Rota* virus was detected in 10.6% of diarrhoeic animals (11.6% of lambs and 9.2% of goat kids), whereas it was detected only in 1.9% of non-diarrhoeic animals (2.1% of lambs and 1.5% of goat kids). The rate of infection with *Corona* virus was 1.3% of diarrhoeic animals (1.6% of lambs and 0.8% of goat kids). On the other hands, *Corona* virus was not detected in any non-diarrhoeic lambs and goat kids. While in children, Rota virus was detected in 11.3% of diarrhoeic children (16% of shepherds and 9.1% of their households), whereas, it was detected only in 4% of non-diarrhoeic children. Corona virus was not detected in any examined children by using antiserum of bovine *Corona* viruses .

Enterotoxigenic *E.coli* (ETEC) was isolated from 29.5% and 21.7% of diarrhoeic lambs and goat

kids, respectively. Moreover, Salmonella was isolated from 15.3% and 10.8% of diarrhoeic lambs and goat kids, respectively. Regarding children, *E. coli* was isolated from 26.3% and 12% of diarrhoeic and non-diarrhoeic children respectively.while., *Salmonella* was isolated from 5% of diarrhoeic children only. The isolated pathogenic *E. coli* and *Salmonnellae* serotypes were identified. In vitro sensitivity test showed that most Salmonellae (94.4%) and *E. coli* (87.5%) strains were highly sensitive to Enrofloxacin and Gentamicin.Treatment trials of the diseased animals with antibiotics according to the result of sensitivity test in addition to fluid therapy were done.

Parasitological examination revealed that *Cryptosporidium parvium* was detected in 15.2% of diarrhoeic animals (16.8% of lambs and 12.5% of goat kids), whereas, it detected only in 3.1% of non-diarrhoeic lambs and goat kids. On the other hand, *C. parvium* was detected in 5% of diarrhoeic children (8% of shepherds and 3.6% of their households). Moreover, *C.parvium* was detected in one faecal sample of an apparently healthy shepherd. Concurrent infections of Rota viruses with *E. coli* and/or cryptosporidia were found in diarrhoeic animals and children.

Finally, the obtained results indicate that higher occurrence and mixed infections of enteropathogens in diarrhoeic lambs, goat kids and children than non-diarrhoeic, suggesting their significance roles in the morbidity and mortality of these animals. The zoonotic importance of the recovered enteropathogens was discussed .

## INTRODUCTION

Enteritis and diarrhea are important problems in young animals and children allover the world especially in developing countries. Despite the large number of enteropathogens identified in recent years, in many cases of enteritis the cause remains undertermmed. *Rota viruses; Corona-viruses, Escherichia coli, Salmonella* and *Cryptosporidium* yet still are the most important causes of enteritis in lambs, goat kids and children as previously reported by several investigators (Kaminjolo et al., 1993; Kaminjolo and Adesiyun, 1994; Abou El-Hassan, 1996; Wasfy et al., 2000; Ali, 2001; and Causape et al., 2003). These enteropathogens cause direct and indirect economic losses due to its higher morbidity and mortality rates in young calves, lambs and goat kids. Furthermore, their significance public health hazards among human incontact with infected animals. As they are transmissible between animals and man (Acha and Szyfer, 1991 and Mahdi and Ali, 2002).

*Rota* viruses have been implicated in diarrhea of lambs, kids and children in about 20 to 60% of cases. Recent evidence has confirmed that rota viruses are not strictly species –specific. Moreover, human and animal rota-viruses are morphological identical under electron microscopy. Experimental cross–infections with human and animal were

occurred. *Rota* viruses of human origin can be transmitted to suckling pigs, calves, lambs, dogs and newly born rhesus monkeys, causing either diarrheal disease or only infection (Nagy et. al.,1989 and Munoz et al., 1996 ).

*Corona* virus known as a causative agent of diarrhea in newborn animals have been isolated from children stool (Simhon and Mata, 1985).

*E.coli* and *Salmonella* are traditionally enteric bacteria associated with enteritis and diarrhea. They are ubiquitous in nature and continue to be a major concern for animal and human health. *Enterotoxigenic E.coli* (ETEC) have been isolated from scouring lambs, goat kids and children (Cobeljic et al., 1989; Kain et al., 1991; and Abou –Zaid et al., 2000 ).

*Cryptosporidium* may produce a cholera-like diarrhea in both immuno-competent and immunodeficient man and animals. It exhibits little or no host specificity and may infect a variety of tissues. The infection is self-limiting, except in immunodeficient hosts, in which it may cause protracted and untreatable diarrhea (O'Donoghue, 1995). Zoonotic transmission of *Cryptosporidium* from calves, lambs and goat kids to their human caretakers have been previously reported (Nagy et al., 1989 and Selim 1995). *Cryptosporidium* is frequently occurs along with Rota virus, *Corona* virus, *E. coli* or Salmonellae (Mata et al., 1983 and Nagy et al., 1983). In such multiple infections, the enteropathogens may act synergistically to increase morbidity and mortality (Current, 1985).

On account of the importance of animal and human infection with these enteropathogens, this study was undertaken to determine the occurrence and the roles of the newly recognized and traditionally enteropathogens in enteritis and diarrhea in lambs, goat kids and children. Also the role of such animals as a reservoir for human infection was investigated .

## MATERIAL AND METHODS

**Animals :** A total of 470 (310 diarrhoeic and 160 non-diarrhoeic) lambs and goat kids were investigated (Table 1). The examined animals aged from 1- 45 days and located in four herds in Sharkia and Dakahlyia Provinces during 2003. Both species in these herds were mainly reared under semi-intensive husbandry for meat production. The clinical examination of the diseased animals were carried out and the clinical signs were recorded.

**Children :** A total of 130 (80 diarrhoeic and 50 non-diarrhoeic) children were examined. These included 45 shepherds of the four sheep and goat herds and 85 house-hold children living with the shepherds (Table 1). The children ages were ranged from 2 to 10 years.

Table (1) : Number of examined animals and children.

| Source | Total examined number | Condition | |
|---|---|---|---|
| | | Diarrhoeic (diseased) | Non-diearrhoeic (Apparently healthy) |
| **Animals:** | | | |
| Lambs | 285 | 190 | 95 |
| Goat kids | 185 | 120 | 65 |
| **Total** | 470 | 310 | 160 |
| **Children:** | | | |
| Shepherds | 45 | 25 | 20 |
| House-holds | 85 | 55 | 30 |
| **Total** | 130 | 80 | 50 |

**Samples:** Faecal swabs and samples were collected from diarrhoeic(diseased) and non-diarrhoeic (apparently healthy) animals and children. The samples were subjected for virological, bacteriological and parasitological examination.

Swabs from intestine, were taken under aseptic condition from 18 recentely dead animal (10 lambs and 8 goat kids) for bacteriological examination.

**I. Virological examination :**

Detection of Rota viruses: Animal or human faecal specimens were diluted 1 : 5 (20%) in phosphate-buffered saline solution (pH, 7.2) and were clarified by centrifugation 3000 r.p.m. for 10 minutes. The supernatants were taken, filtered and stored at -20°C until used. The supernatants were examined for the presence of Rota –viruses using commercial latex agglutination test (Slidex Rota kit II, Biomèrieux, Marcy-L'Etoile, France) according to Haikala et al. (1983) and Brandt et al. (1987).

**Detection of Corona viruses:**

Hyperimmune antiserum to sucrose density gradient –purified bovine – *Corona* virus kindly supplied by Animal Health Research Institute, Dokki, Giza. Hyperimmune serum obtained from Dr. Linda Saif, Laboratory in the Ohio Agriculture Research and Development Center Wooster, USA. Animal or human faecal samples were examined for the presence of Corona-viruses by haemagglutination (HA) and haemagglutination inhibition lest (HI) according to Sato et al. (1984) and Sato et al. (1977) respectively .

**II. Bacteriological examinations :**

The collected animal and human faecal swabs as well as from recently dead animals were directly immersed into nutrient broth and tetrathionate broth and incubated for 18 – 24 hours at 37°C, then loopfuls from the growth were streaked on MacConkey agar, Eosine methylene blue (EMB) and Xylose-lysine desoxycholate agar (XLD) plates. All plates were incubated at 37°C for 24 -48 hours. The suspected colonies were picked, purified on trypticase soya agar and incubated at 37°C for 48 hours.

The purified colonies were identified on the bases of morphological, cultural and biochemical characters as previously described (Cruickshank et al., 1982 and Koneman et al., 1992).

**Serological identification of Salmonella and *E.coli*:**

Isolates that proved to be Salmonella were serologically typed according to Kauffmann-White Scheme (Kauffmann, 1972), using polyvalent and single factor sera of Salmonella O and H sera (Wellcome Reagents Limited, England).While, E. coli isolates were serotyped by the use of a commercial slide agglutination kit that contained pathogenic *E. coli* O-antisera (a set of polyvalent antisera, 8 vials and related monovalent sera, 43 vials) and toxigenic *E. coli* pilli antiserum. All were obtained from Denka, Seiken Co., Ltd, Japan. The serogroups of pathogenic *E. coli* isolated from animals were subcultured into Minica polyvitalex agar for detection of *E. coli* K99 antigen .

Antibiotic sensitivity test was carried out on 34 (16 *E. coli* and 18 *Salmonella*) strains isolated from animals and children. In vitro sensitivity test was performed according to Cruickshank et al., (1982) using antibiotic discs (Oxoid) containing different concentrations.

**III. Parasitological examination :-**

Animal or human faecal samples were examined for the presence of Cryptosporidium oocysts using cover slip floatation with Sheather, sugar solution (Anderson, 1981). Smears were made from meniscus of the supernatant, air dried, fixed, and stained with Giemsa or modified Ziehl-Neelsen stains. The slide was examined under X 400. *Cryptosporidium* oocysts were then morphologically identified (Reese et al., 1982).

**Treatment trials:** The diseased animals were treated with antibiotic according to the result of sensitivity test (Gentamicin , 5 mg /Kg B.W. orally for 5 days, Schering-Plough Ainmal Health, USA.) and fluid therapy orally and intravenous.

## RESULTS

The observed clinical signs of diseased lambs and goat kids were fever, diarrhea, deviation of head and neck and congestion of mucous membranes. The morbidity rate was 65.9% (310 out of 470).

**Result of virological examination :-**

Table (2) : Shows the occurrence of *Rota* virus in examined lambs and goat kids .

| Animals | Diarrhoeic (Diseased) | | | Non-diarrhoeic (Apparently healthy) | | |
|---|---|---|---|---|---|---|
| | No. of examined | No. of positive | % | No. of examined | No. of positive | % |
| Lambs | 190 | 22 | 11.6 | 95 | 2 | 2.1 |
| Goat kids | 120 | 11 | 9.2 | 65 | 1 | 1.5 |
| Total | 310 | 33 | 10.6 | 160 | 3 | 1.9 |

Table (3): Shows the occurrence of *Corona* virus in examined lambs and goat kids.

| Animals | Diarrhoeic (Diseased) | | | Non-diarrhoeic (Apparently healthy) | | |
|---|---|---|---|---|---|---|
| | No. of examined | No. of positive | % | No. of examined | No. of positive | % |
| Lambs | 190 | 3 | 1.6 | 95 | 0 | 0 |
| Goat kids | 120 | 1 | 0.8 | 65 | 0 | 0 |
| Total | 310 | 4 | 1.3 | 160 | 0 | 0 |

Table (4): Shows the occurrence of *Rota* and *Corona* virus in examined children stool samples.

| Source of children samples | Total examined number | Rota virus | | Corona virus | |
|---|---|---|---|---|---|
| | | No. of positive | % | No. of positive | % |
| Diarrhoeic | | | | | |
| **Shephreds** | 25 | 4 | 16 | 0 | 0 |
| **House-holds** | 55 | 5 | 9.1 | 0 | 0 |
| Total | 80 | 9 | 11.3 | 0 | 0 |
| Non-diarrhoeic | | | | | |
| **Shephreds** | 20 | 1 | 5 | 0 | 0 |
| **House-holds** | 30 | 1 | 3.3 | 0 | 0 |
| Total | 50 | 2 | 4 | 0 | 0 |

**Result of bacteriological examination:-**

Table (5): Frequency distribution of isolated Enterotoxigenic *E .coli* (ETE C) and *Salmonellae* from examined lambs and goat kids.

| Animals | Total No. of examined | ETE coli | | *Salmonellae* | |
|---|---|---|---|---|---|
| | | No. of positive | % | No. of positive | % |
| **Diarrhoeic** (diseased) | | | | | |
| Lambs | 190 | 56 | 29.5 | 29 | 15.3 |
| Goat kids | 120 | 26 | 21.7 | 13 | 10.8 |
| **Total** | 310 | 82 | 26.5 | 42 | 13.5 |
| **Non diarrhoeic** (Apparently healthy) | | | | | |
| Lambs | 95 | 0 | 0 | 0 | 0 |
| Goat kids | 65 | 0 | 0 | 0 | 0 |
| **Total** | 160 | 0 | 0 | 0 | 0 |

Table (6): Frequency distribution of isolated *E. coli* and *Salmonellae* from examined children stool samples.

| Source of children samples | Total No. of examined | *E. coli* | | *Salmonellae* | |
|---|---|---|---|---|---|
| | | No. of positive | % | No. of positive | % |
| **Diarrhoeic** | | | | | |
| shephreds | 25 | 8 | 32 | 2 | 8 |
| House-holds | 55 | 13 | 23.6 | 2 | 3.6 |
| **Total** | 80 | 21 | 26.3 | 4 | 5 |
| **Non-diarrhoeic** | | | | | |
| shephreds | 20 | 3 | 15 | 0 | 0 |
| House-holds | 30 | 3 | 10 | 0 | 0 |
| **Total** | 50 | 6 | 12 | 0 | 0 |

Table (7): Serological identification of pathogenic *E. coli* isolated from examined children.

| Source of Isolates | Total No. of Isolates | O26 | | O55 | | O86a | | O111 | | O119 | | Untyped | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Shepherds | 11 | 3 | 27.3 | 0 | 0 | 1 | 9.1 | 2 | 18.2 | 2 | 18.2 | 3 | 27.3 |
| House-holds | 16 | 1 | 6.3 | 3 | 18.8 | 3 | 18.8 | 2 | 12.5 | 2 | 12.5 | 5 | 31.3 |
| Total | 27 | 4 | 14.8 | 3 | 11.1 | 4 | 14.8 | 4 | 14.8 | 4 | 14.8 | 8 | 29.6 |

Table (8) : Serological identification of Salmonellae isolated from examined lambs, goat kids and children.

| Source of isolates | Total No. of Isolates | Salmonella typhimurium | | Salmonella dublin | | Unclassified Salmonella | |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % |
| **Animals** | | | | | | | |
| Lambs | 29 | 13 | 44.8 | 9 | 31 | 7 | 24 |
| Goat kids | 13 | 8 | 61.5 | 3 | 23.1 | 2 | 15.4 |
| **Total** | 42 | 21 | 50 | 12 | 82.6 | 9 | 21.4 |
| Children | 4 | 3 | 75 | 0 | 0 | 1 | 25 |

Table (9): Results of antibiotic sensitivity test for some *E. coli* and Salmonella strains isolated from examined animals and children.

| Antibiotic disc | Sensitive Strains to different antibiotics | | | |
|---|---|---|---|---|
| | *E.coli* isolates (16) | | Salmonella isolates (18) | |
| | No. | % | No. | % |
| Enrofloxacin | 14 | 87.5 | 17 | 94.4 |
| Gentamicin | 14 | 87.5 | 17 | 94.4 |
| Amoxycillin | 12 | 75 | 15 | 83.3 |
| Chloramphenicol | 12 | 75 | 15 | 83.3 |
| Neomycin | 13 | 81.3 | 14 | 77.8 |
| Colistin Sulphate | 13 | 81.3 | 14 | 77.8 |

The mortality rate was 13.4% (42 out of 310), Photo 1, 2.

Postmortem examination of recently dead animals showed haemorrhagic enteritis, congestion of mes-

Table (10): Shows the occurrence of Cryptosporidium parvium in examined lambs and goat kids.

| Animals | Diarrhoeic (Diseased) | | | Non-diarrhoeic (Apparently healthy) | | |
|---|---|---|---|---|---|---|
| | No. of examined | No. of positive | % | No. of examined | No. of positive | % |
| Lambs | 190 | 32 | 16.8 | 95 | 3 | 3.2 |
| Goat kids | 120 | 15 | 12.5 | 65 | 2 | 3.1 |
| Total | 310 | 47 | 15.2 | 160 | 5 | 3.1 |

Table (11) : Shows the occurrence of Cryptosporidium parvium in examined children.

| Source of children samples | No. of examined | Cryptosporidium parvium oocysts | |
|---|---|---|---|
| | | No. of positive | % |
| **Diarrhoeic** (diseased) | | | |
| Shephreds | 25 | 2 | 8 |
| House-holds | 55 | 2 | 3.6 |
| Total | 80 | 4 | 5 |
| **Non-Diarrhoeic** (Apparently healthy) | | | |
| Shephreds | 20 | 1 | 5 |
| House-holds | 30 | 0 | 0 |
| Total | 50 | 1 | 2 |

Table (12): Summarized results of virological, bacteriological and parasitological examinations of diarrhoeic (diseased) and non-diarrhoeic (apparently healthy) lambs and goat kids.

| Source of animal samples | Total examined number | Rota-viruses | | Corona-viruses | | ETEC | | Salmonella species | | Cryptosporidium parvium | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | No. | % | No. | % |
| **Lambs** | | | | | | | | | | | |
| Diarrhoeic | 190 | 22 | 11.6 | 3 | 1.8 | 56 | 29.5 | 29 | 15.3 | 32 | 16.8 |
| Non-diarrhoeic | 95 | 2 | 2.1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3.2 |
| **Total** | 285 | 24* | 8.4 | 3 | 1.1 | 56 | 19.6 | 29 | 10.2 | 35 | 12.3 |
| **Goat kids** | | | | | | | | | | | |
| Diarrhoeic | 120 | 11 | 9.2 | 1 | 0.8 | 26 | 21.7 | 13 | 10.8 | 15 | 12.5 |
| Non-diarrhoeic | 65 | 1 | 1.5 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3.1 |
| **Total** | 185 | 12** | 6.5 | 1 | 0.5 | 26 | 14 | 13 | 7 | 17 | 9.2 |
| **Total** | 470 | 36 | 7.6 | 4 | 0.8 | 82 | 17.4 | 42 | 8.9 | 52 | 11.1 |

* Three were Rota mixed with corona viruses infection, 18 samples were Rota mixed with ETEC, Salmonella or cryptosporidium, other three were Rota only.

** Eight were Rota mixed with corona or ETEC; one was Rota mixed with Salmonella, two were Rota with Cryptosporidium and one was Rota only.

Table (13): Frequency distribution of enteric pathogens recovered from examined children.

| Source of children samples | Total examined number | Rota-viruses | | Corona-viruses | | ETEC | | Salmonella species | | Cryptosporidium parvium | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. of +Ve | % | No. of +Ve | % | No. of +Ve | % | No. of +Ve | % | No. of +Ve | % |
| **Shepherds** | | | | | | | | | | | |
| Diarrhoeic | 25 | 4 | 16 | 0 | 0 | 8 | 32 | 2 | 8 | 2 | 8 |
| Non-Diarrhoeic | 20 | 1 | 5 | 0 | 0 | 3 | 15 | 0 | 0 | 1 | 5 |
| Total | 45 | 5 | 11.1 | 0 | 0 | 11 | 24.4 | 2 | 4.4 | 3 | 6.7 |
| **Household** | | | | | | | | | | | |
| Diarrhoeic | 55 | 5 | 9.1 | 0 | 0 | 13 | 23.6 | 2 | 3.6 | 2 | 3.6 |
| Non-Diarrhoeic | 30 | 1 | 3.3 | 0 | 0 | 3 | 10 | 0 | 0 | 0 | 0 |
| Total | 85 | 6 | 7.1 | 0 | 0 | 16 | 18.8 | 2 | 2.4 | 2 | 2.4 |
| **Total** | 130 | 11* | 8.5 | 0 | 0 | 27 | 20.8 | 4 | 3.08 | 5 | 3.8 |

* Three were *Rota* virus alone;7were *Rota* virus mixed with *E.coli*, one was *Rota* virus mixed with *E.coli* and *cryptosporidium* parvium.

Photo (1): Dead lamb due to enteric pathogen

Photo (2): Diseased lamb.

Photo (3): Postmortem examination showed haemorrhagic enteritis.

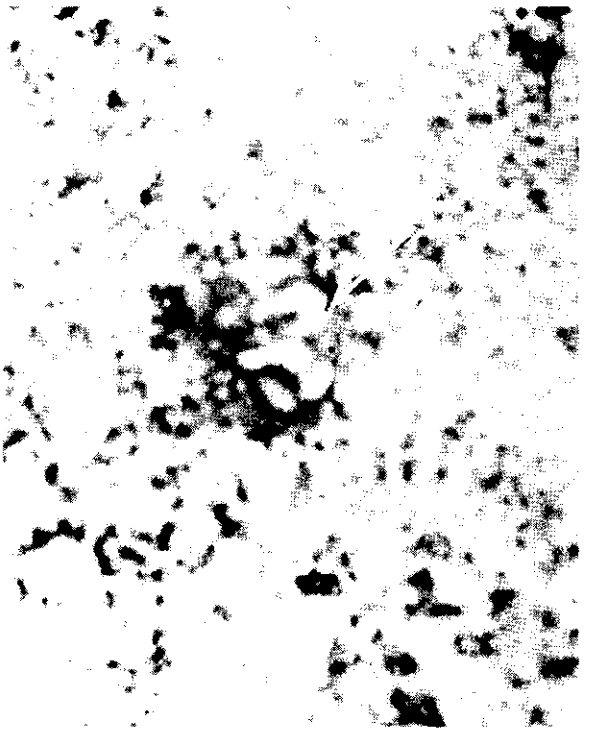

Photo (4): Cryptosporidium parvium oocyst.

enteric lymph nodes and congestion and enlarged livers, Photo 3 .

**Result of parasitological examination :-**

Cryptosporidium parvium oocysts were detected in collected faecal samples from animals and children (Photo 4).

Treatment of the diseased cases with specific antibiotic (Gentamicin), in addition to fluid replacement gave good results.

## DISCUSSION

Infectious diarrhea is a common condition affecting lambs and goat kids especially those are breed under intensive or semintensive systems of breeding. Most of the infectious agents that cause diarrhea of lambs and goat kids are transmissible to man. The aetiology and epidemiology of the diarrhea have been extensively studied in cattle and pigs, however, few studies have been performed to investigate the enteric pathogens that cause diarrhea in newborn lambs and goat kids .Also,, to discuss the zoonotic importance of these enteropathogens. In this study the potential role of Rota viruses, Corona viruses, E.coli, Salmonella and Cryptosporidium in the aetiology of diarrhea in lambs, goat kids and children was assessed by determination the occurrence of these enteropathogens in diarrhoeic and non-diarrhoeic animals and children, and by studying the zoonotic aspects of the isolated enteropathogens.

The results of occurrence of Rota virus in lambs and goat kids are shown in table (2). The percentages of Rota virus in diarrhoeic lambs and goat kids were 11.6 and 9.2, whereas in non diarrhoeic lambs and goat kids were 2.1% and 1.5%, respectively. This results are supported by Abou El-Hassan (1996) who reported the prevalence of Rota viruses in diarrhoeic lambs and goat kids were 34.5% and 23.5%, whereas in apparently healthy lambs and goat were 12% and 8%, respectively. However, Munoz et al., (1996) found that Rota-viruses were detected in 2.1% and 21.6% of diarrhoeic lambs and goat kids, whereas, it was detected in 2.5 and 19.4% in non-diarrhoeic lambs and goat kids, respectively. Fassi-Fehri et al. (1988) found that the frequency of Rota virus in diarrhoeic lambs was 30%. Moreover, Kaminjolo and Adesiyun (1994) found that 48.6% and 28.6% of young lambs and goat kids, were positive for Rota virus antigen using latex agglutination test.

It was evident from the results achieved in Table (3) that Corona viruses were detected in 1.6% and 0.8% of diarrhoeic lambs and goat kids, respectively. This results were in agreement with the results previously reported by Selim et al. (1997) who detected Corona-viruses in the faeces of wild ruminant including sheep using anti-bovine Corona-virus antibodies.

Corona viruses were detected in several occasions in diarrhoeic lambs and goat kids (Nagy et al., 1983). Corona virus was not detected in non-

diarrhoeic lambs and goat kids. This may be due to a very low prevalence of infection in both species.

Regarding the occurrence of Rota and Corona viruses in children, Table (4) showed that Rota virus was detected in 11.3% of diarrhoeic children (16% of shepherds and 9.1% of their households), whereas, it was detected only in 4% of non-diarrhoeic children. This results were nearly similar to previously reported by Cobeljic et al., (1989); Kain et al., (1991) and Nieminska-Gromada and Szych (1998). On the other hand, Corona-virus was not detected in any examined faecal samples of children using anti-bovine Corona-virus antibodies. This may be due to either a very low prevalence of infection in children in the study areas or that human Corona viruses are not antigenically related to bovine Corona viruses .

From the results achieved in Table (2,3,4), one could conclude that Rota-viruses are frequently detected in diarrhoeic lambs, goat kids and children, suggesting their significance role in the disease. On the other hand, from the zoonotic point of view, the higher occurrence (16%) of Rota-virus in diarrhoeic shepherds, this suggests the roles of sheep and goats as a potential reservoir of human infection with Rota-viruses .

The presence of Rota-virus in apparently healthy animals and children may play an important role as a reservoir and source for another animals and human cases. Furthermore, the detection of Corona virus in only diarrhoeic lambs and goat kids, reflecting the role of Corona-virus in diarrheal illness in these animals.

The frequency distribution of isolated ETE coli and Salmonella from lambs and goat kids are summarized in Table (5). ETEC were isolated from 29.5% and 21.7% of diarrhoeic lambs and goat kids respectively. Almost similar results (30% and 22%) was previously recorded in diarrhoeic lambs and goat kids by Munoz et al., 1996.

Moreover, El-Gemiey (1999) isolated *E. coli* from 30% of newly-born diarrhoeic lambs. Ali (2001) found that 36% and 30% of diarrhoeic lambs and goat were positive for E. coli. E. coli with at least one virulence factor were previously isolated from diarrhoeic lambs and goat kids (Munoz et al., 1996). Fassi –Fehri et al., (1988) found that the frequency of *E. coli* K99 antigen in diarrhoeic lambs was 30% .

It was evident from the results achieved in Table (5) that Salmonella was isolated from 15.3% and 10.8% of diarrhoeic lambs and goat kids, respectively. The isolation of Salmonella from diarrhoeic lambs and goat kids, was previously reported by Adesiyun et.al.(1993);El-Gemiey (1999) and Abou-Zaid et al. (2000). On the other hand, ETEC and Salmonella were not isolated from apparently healthy lambs and goat kids.

These results were similar to results previously recorded by Abou-El-Hassan (1996).

Regarding children, Table (6) showed that E. coli was isolated from 26.3 and 12% of diarrhoeic and non-diarrhoeic children. Nearly similar results were previously reported by Mikhail et al. (1989); Kain et al. (1991) and Nieminska-Gromada and Szych (1998). Moreover, salmonellae were isolated from 5% of diarrhoeic children and not detected in any examined faecal sample of apparently healthy children. Nearly similar results were previously cited by Zaki et.al (1986); Cobeljic et al. (1996); Nieminska-Gromada and Szych (1998) and Wasfy et al. (2000).

It is evident from the results acheved in Table (7) that 27 *E. coli* strains isolated from children were belonged to O26; O55; O86a; O111 and O119 serotypes. Akinterinwa and Paul (1981) isolated 10 pathegenic E. coli from 84 infants and they identified into O55; O86; O128; O44 and O124. Moreover, Cobeljic et al. (1989) found that O111; O119; O114; O55; O18; O86 ; O128; O127 and O142 were the most identified serogroups of *E.coli* isolated from diarrhoeic and non-diarrhoeic children.

Serotyping of *Salmonellae* isolated from animals and children are shown in Table (8). Forty two Salmonella strains isolated from animals were belonged to *S. typhimurium* (21); S. dublin (12) and *unclassified Salmonellae* (9). However, four *Salmonella* strains recovered from human were belonged to S. *typhimurium* (3) and *unclassified Salmonellae* (1). These results were in agreement with Smith and Sherman (1994) and Abou – Zaid et al. (2000) who reported that Samonella typhimurium was the predominant strains recovered from diarrhoeic lambs and goat kids. Kain et al. (1991) found that *Salmonella typhimurium* consitituted 33.3% of Salmonellae strains recovered from children. However, Graham et al. (2000) found that *Salmonella typhimurium* was predominant (79%) strains recovered from children .

Results of antibiotic sensitivity of *E. coli* and Salmonella strains recovered from animals and children are summarized in Table (9). Most tested *E. coli* and Salmonella strains were highly sensitive to Enrofloxacin and Gentamicin (87.5 – 94.4%), whereas their sensitivity to Neomycin, Chloramphenicol, Amoxycillin and colistin sulphate were varied from 75% to 83.3%. These results were nearly similar to the results previously recorded by Ali (2001). However Cobeljic et al. (1996) found that O4-*E. Coli* strains were resistant to chloramphenicol, ampicillin, cephalosporin, kanamycin and tetracycline.Treated animals with antibiotic (Gentamicin) and fluid therapy were improved.This may be due to the treatment was done according to the result of sensitivity test , maintenance the circulatory volume and corrected electrolyte imbalance.

From the obtained results, we could conclude

that ETEC seems to be the predominant enteropathogens which plays the major role among diarrhoeic lambs, goat kids and children. Moreover, Salmonella and *E.coli* are frequently isolated from diarrhoeic lambs, goat kids and children suggests their significance role in the aetiology of the disease. The higher isolation rate of these enteropathogens in shepherds indicates the potential role played by sheep and goats for transmission these agents to man.

Concerning the occurrence of *Cryptosporidium parvium* in lambs and goat kids, Table (10) showed that *C. parvium* was detected in 15.2% of diarrhoeic animals (16.8% of lambs and 12.5% of goat kids) whereas only 3.1% of apparently healthy animals were shedding *C. parvium* oocysts in their faeces. Nearly similar results were previously cited by Kaminjolo et al. (1993) and Selim (1995). Higher incidences (68.3, 48.3 and 30%) of *Cryptosporidium* infection in lambs using three staining techniques were previously cited by Abd El-Wahed (1999).

Regarding children, Table (11) showed that C. parvium was detected in 5% of diarrhoeic children (8% of shepherds and 3.6% of their household). On the other hand C. parvium was detected in a faecal sample (2%) of an apparently healthy children. Almost similar results were previously cited by Amin and El-Ahraf (1988) ; Plotnikova et al. (1990) ; Krause et. al.(1995) and Mahdi and Ali (2002).

From the obtained results, we could conclude that *Cryptosporidium* parvium was frequently detected in diarrhoeic lambs, goat kids and children suggests its significant role which may play as an aetiological agent of diarrhea in these young animals and children. Moreover, its presence in apparently healthy animals and children represents a risk hazard for young animals and man. On the other hand, higher occurrence in shepherds may be reflect the potential role which might be played by lambs and goat kids for transmission of Cryptosporidium to shepherds.

It is evident that from the results summarized in Table (12) that the percentages of *Rota*-viruses, *Corona* viruses, ETEC, *Salmonella* and *Cryptosporidium* in diarrhoeic lambs and goat kids were higher than in apparently healthy lambs and goat kids and they were slightly high in lambs than in goat kids. On the other hand, concurrent infections were observed in both lambs and goat kids in this study especially ETE coli with *Rota* virus or *Cryptosporidium*. Lambs and goat kids are at high exposure risk to ETE coli, Rota virus or Salmonella species, starting immediately after birth and the direct and indirect contact with adult sheep and goats which frequently had asymptomatic infections must be considered as a possible intiating cause (Snodgrass and Angus, 1983; Kaminjolo and Adesiyun, 1994). Moreover, ETE coli and *Cryptosporidium* were the most frequently detected enteropathogen in diarrhoeic

lambs and goat kids, explaining their principle role in the disease .

It is evident from the results summarized in Table (13) that the percentages of *Rota*, *E. coli*, Salmonella and Cryptosporidium were higher in diarrhoeic children than apparently healthy, this suggests their role in diarrhea and enteritis. E. *coli* and *Rota* virus were most frequently enteric pathogenic detected in diarrhoeic children. Moreover, concurrent infections of *E. coli* with Rota virus were recorded in this study. Moreover, the occurrence of *Rota* virus, *E. coli*, *Salmonella* and *Cryptosporidium* in shepherds higher than household children may be indicate the role of sheep and goat as a potential reservoir of such zoonotic agents.

It could be concluded that *Rota* viruses, *Corona* viruses, ETE coli, *Salmonella* and *Cryptosporidium* were frequently isolated in diarrhoeic lambs and goat kids. Single or concurrent infections were observed in both species. These enteropathogens had a significant role in morbidity and mortality of these young animals which lead to economic loss of herd capital. ETE coli and *Cryptosporidium* were most frequently detected enteropathogens. Regarding children, *Rota* virus, *E. coli*, *Salmonella* and *Cryptosporidium* were frequently isolated from diarrhoeic children. Rota virus and *E. coli* were most frequent detected pathogens. Mixed infection with these pathogens were observed. Shepherds showed higher occurrence of most of these enteropathogens, reflecting the role of lambs and goat kids in transmission such zoonoses. So, it is advisable to monitor the prevalence of these enteropathogens in diarrhoeic and non diarrhoeic animals and their shepherds, to determine the most isolated organism and serotypes overtime and locality. Vaccination of the pregnant dams can reduce the risk of infection to their offspring and reduce the severity of diarrhea. Reducing of faecal shedding of these enteropathogens may reduce the risk of hazard to animals and human. Shepherds and animal breeders must be aware of the disease in sheep and goats in order to avoid great losses and to prevent its transmission to human.

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