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PREVALENCE OF ROTA VIRUS INFECTION AMONG CHILDREN WITH ACUTE GASTROENTERITIS IN THI-QAR GOVERNORATE

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SUMMARY

1- From 1st of march 2005 to 29th of February 2006. 1000 children under 5 years age with acute gastroenteritis seen in outpatient and inpatient departments of child and maternity teaching hospital in the city of Nassiryia were studied .
2- One Hunderd children under 5 years of age admitted to the hospital for reasons other than vomiting and diarrhea, were randomly selected and regarded as control.
3- Stool specimens of both study and control patients were examined for the presence of Hunman Rota Virus antigen by latex agglutination test(LA) .
4- Human Rota Virus antigen was detected in stool samples of 39% of the study cases and 2% of the control group.
5- The antigen was detected more in specimens of infants particularly those between 6-18 months of age.
6- The incidence of infection was lowest among exclusive breast –fed infants.
7- Males were more commonly affected than females , but no difference was seen among different socio-economic classes.
8- Human Rota Virus antigen was detected throughout the period of the study with significant increase during winter months.
9- Children with acute Rota Virus gastroenteritis have certain clinical features and laboratory result, these features and results collectively can be of help in presumption of a clinical diagnosis for the condition .

INTRODUCTION AND REVIEW OF LITERATURES

Human Rota Virus a major cause of acute gastroenteritis in infants and children under 5 years of age, and produces significant morbidity and mortality(Maki 1981. Black Etal 1982)

Rota virus is responsible for 25-65% cases of gastroenteritis in hospital surveys (Hart and Ibrahim 1989).

Epidemiology of Human Rota Virus Gastroenteritis

1- Age distribution:

Human Rota Virus gastroenteritis is commonly seen between 6-24 months, the disease is uncommon before 6 months and after 24 months of age(Dutta et al 1990)

It is estimated that 62% of infants had at least one infection with Human Rota Virus by the age of 2 years , although the disease is uncommon in the first 6 months of life , an epidemic of neonatal gastroenteritis due to Human Rota Virus has been reported in London (Gurwith et al 1981) .

2- Sex distribution:

Rota Virus gastroenteritis is seen more among males than famales 9 (Nabeel et al 1986, Ho et al 1988) .

3-Geographical distribution :

Human Rota Virus gastroenteritis is world wide in distribution (kapikain et al 1976), the disease is seen in

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developing and developed countries (Black 1980, presson et al 1982, Hart and Ibrahim 1989) .

Human Rota Virus infection appears to be lower in patients from rural areas , than urban populations, (Dowling and Wynne 1981), but different result is reported in Iraq by Hassony and Abdul-Aziz 1989, who observed that Human Rota Virus gastroenteritis was more common in rural populations .

4- Seasonal variations:

Human Rota Virus infection is seen throughout the year , but more cases are reported in the cold season (Giassudin 1981, Dutta et al 1990) .

5- Mode of transmission:

Human Rota Virus is contagious disease, it spreads by fecal- oral route (Walker Smith 1978) .

Respiratory mode of transmission has been suggested because of the association of Human Rota Virus with respiratory signs and symptoms (Lewis et al 1979) , but no Rota Virus particles are detected in the respiratory secretions with Rota Virus gastroenteritis by using electron microscopy , and ELISA test, although this may not be inclusive result because the virus may be present in low concentration to be detected (Gold Water et al 1979) .

6- Socioeconomic state:

Socioeconomic state of the family is not related to the incidence of Rota Virus infection (seonarto et al 1983) . Dutta et al 1990 found a higher incidence of Rota Virus infection in children of educated mothers than in children of mothers with no education.

7- Clinical features:

Several investigators described that the patients with Rota Virus gastroenteritis shows a clinical pattern consisting of ; an infant with respiratory manifestations, fever, vomiting and diarrhea in a cold season, and a clinician could make a presumptive diagnosis (Lewis et al 1979) .

Vomiting occurs commonly among patients with Rota Virus gastroenteritis , it starts suddenly, and as initial manifestation in 55% of the cases , preceding the diarrhea from few to 24 hours , in 22% of cases vomiting occurs simultaneously with diarrhea (Maki 1981, persson ett al 1982) .

Weinberg et al 1984 observed that breast fed infants with Rota Virus gastroenteritis suffer from vomiting less frequently , because of rapid emptying of the stomach and human milk being well tolerated by infants.

Lewis et al 1979 recorded that vomiting is less frequent, but of longer duration in non Rota virus gastroenteritis.

Diarrhea of Rota Virus described as more watery and more frequent from that seen in non Rota Virus diarrhea (person at al 1982, Hart and Ibrahim 1989) .

Dutta et al 1990 described the diarrhea as watery and without blood pus or mucus .

Tallet et al 1977 observed fever in 85% of their patients with acute Rota virus gastroenteritis , this incidence is higher from that seen in non Rota virus gastroenteritis (person et al 1982).

Upper respiratory manifestations, such as cough , rhinitis were reported in 66% of Rota virus gastroenteritis and usually precedes the gastrointestinal symptoms (Lewis et al 1979) .

Ruuska and Vesikari 1990 observed cough , rhinitis and otitis media in 28% of such cases.

Mild dehydration is seen in 95% of Rota virus gastroenteritis but only 5% of the cases suffer from severe degree of dehydration (Sengupta et al 1981) .

Metabolic studies among severe cases reveal mostly isotonic dehydration with compensated metabolic acidosis (hart and Ibrahim 1989) .

Rota virus may have some role in the pathogenesis of chronic diarrhea of 1-6 months duration. In some infants with chronic diarrhea , Rota virus has been detected in their stool by electron microscopy (Shephered et al 1975, Walker Smith 1978).

Rota virus may produce chronic infection in immune deficient children in whom all investigations are negative except for isolation Rota virus in their stool (Saulsbury et al 1980) .

Guarino et al 1991 , showed that Human Rota virus was detected in two children not immune deficient having chronic diarrhea , with shedding of Rota virus lasting 4, 7 months respectively , and search for infectious agent other than Rota virus was negative and other known cases of chronic diarrhea such as celiac disease, food intolerance , paranteral infection ,allergic gastroenteropthy, chronic inflammatory bowel disease, and autoimmune enteropathy were excluded by laboratory , radiologic and histologic findings . Both children recovered after duodenal administration of single dose of human serum immunoglobulin containing anti- Rota Virus antibodies.

Rota virus gastroenteritis can be fatal within short period of time, the cause of death is death is mainly dehydration and electrolyte imbalance (Carlson 1978).

Fatal encephalopathy due to direct involvement of central nervous system by Rota virus infection has been reported , so if one sees a child with diarrhea and neurological manifestations , one should think about shigella and Rota virus as well (Keidan et al 1992) .

The association of Rota Virus with other enteric pathogen was observed in 7.2 % of cases , and the occurrence of mixtures of enteric pathogens, increases with increasing age, the enteropathogenic bacteria found in combination with Rota Virus are: Enteropathognic E. Coli, Enterotoxogenic E. Coli , Yersinia enterocolitica, Compylobacter Jejuni, Shigella species, Salmonella and Entameba histolytic (Soenarto et al 1983).

The duration of diarrhea is longer in mixed infection than with Rota Virus alone, but the severity of the illness is not changed(Ellis et al 1984, uhnoo et al 1986) .

8-Nosocomial gestro-enteritis:

Rota Virus is hazardous for hospitalized children , in study done by Dennehy and Peter 1985 on 52 hospitalized patients , 36 suffered from Rota Virus gastroenteritis and 3\4 of these illnesses occurred in winter and spring.

Cone et al 1988 observed that the risk of acquiring the infection increases with lack of appropriate of Rota virus infected patients.

9-Prvevention:

A: Breast feeding:

Breast feeding can reduce prevalence of Rota Virus gastroenteritis in a study conducted by Hassony and Abdul-Aziz 1989 on Rota Virus gastroenteritis, they observed hat 15.4 % of infants were breast fed, 58.8% were bottle fed and 41.9 % were mixed fed infants.

A review of thirty-five studies from 14 countries revealed that 80% of these studies , demonstrated the protective nature of breast feeding against infections diarrhea(Feachem et al 1984).

B: Vaccination :

Rota Virus is the single most important cause of acute gastroenteritis in developing countries . According to W.H. O. an effective vaccine against Rota Virus diarrhea will decrease between 200,000-300,000 death in children under 24 months of age annually . (Dozoyza and Feachem 1985).

The local intestinal antibodies play a role inresistance to Rota Virus gastroenteritis.

Live attenuated oral vaccine have been tried and found to be effective in preventing Rota Virus gastroenteritis.

Rhesus vaccine has been given safely with polio vaccine to infants aged 2-3 months and no side effects were recorded (Kapikain et al 1980).

C: Good Hygiene:

Will prevent fecal –oral spread of Rota Virus gastroenteritis (Robert et al 1992) .

10-Treatment:

Most cases of Rota Virus infection are self-limited and can be managed by careful administration of oral fluid and electrolytes rehydration solution , and

once dehydration has been corrected milk feeding can be reinstituted despite on going diarrhea.

The oral rehydration solution(ORS) are effective , cheap and have advantage over the intravenous fluid therapy , by stimulating the recovery of the small bowel absorptive function (William et al 1986) . If emesis preclude enteral intake , IV fluid may have to be administered . There is no specific antiviral therapy for Rota Virus infection , epidemic have been stopped by instituting good hand washing , and on occasion by oral administration of human immunoglobulin (Robert et al 1992) .

Aims of the study

I\ To asses the incidence of Rota Virus infection among children with acute gastroenteritis.

II\To notice the seasonal variation of the disease.

III\To demonstrate the clinical features and laboratory findings that are likely to be observed with Rota Virus gastroenteritis.

IV\To see whether breast feeding offers any protection against Rota Virus infection .

PATIENTS & METHODS

Patients: the study period was one year from the 1st of March 2005 -29th February 2006 .

One thousand children less than five years of age with acute gastro- enteritis included in this study (600 inpatients , 250 outpatients and 150 nosocomial patients).

The source of the patients were from child and maternity teaching in the city of Nassiriya , the patients were selected randomly at a rate 15-30 patients\week .

Parents were interviewed for collecting their information included in the protocol of the study . At the same time 100 children of similar age visited the hospital for reasons other than gestro- enteritis were taken as a control group , to cover the same study period 2-3 controls were examined weekly .

Methods: Fecal samples were collected from all children included in the study. 5-10 grams of stool were obtained from the three groups and control .

Latex agglutination test (Rota- kit Biomerieux- France) for detection of Rota Virus antigen in the stool samples were performed. Principle of the test: The latex particles are coated with rabbit antibodies raised against a pool of different Rota Virus isolates , both human and animal. A fecal extract is prepared , which when added to the test latex reagent agglutinates the latex particles. A control reagent is also included in the kit which consists of latex particles coated with normal rabbit globulins . This reagent is utilized to identify the occasional non specific reactions which may occur. General stool examination for each child , and determination of the stool PH by litmus paper were done. Results were analysed statistically by chi-square and Z tests.

THE RESULTS

1- incidence:

Figure 1- : demonstrate the incidence of Rota Virus infection in the study and control patients.

2-Age distribution:

Figure -2 shows the age distribution of acute Rota Virus gastroenteritis among study patients.The peak age incidence is between 6-18 month.

3-Sex:

Table-1 shows that male children suffer from the illness more frequently than female (P < 0.001)- Socio economic classes:

There was no difference in the incidence of Human Rota Virus gastroenteritis in different Socio economic classes.

5-Seasonal distribution:

The Rota Virus infection was detected through out the period of the study , and a higher incidence was seen in the winter time.

6-Type of feeding :

Table -2- shows feeding types in infants with Rota Virus gastroenteritis , the lowest infection rate was among exclusive breast fed babies and highest rate among those who were on mixed diet.

7-Clinical features :

Table-3- shows features of Rota Virus gastroenteritis.

8-Laboratory features:

In the typical cases, most of the patients showed watery-yellow stool without blood or mucus.

Microscopic examination of the stool showed pus cells in 10% RBCs 4.8 % shown in table 4 . Stool Reaction:

Majority of patients had acidic stool(79% of the cases), breast fed babies had significantly more acid stool than non-breast fed babies as shown in figure -4-

9-Treatment:

Intravenous fluid used for treatment of severely dehydrated patients, antibiotics used unnecessarily in many patients.

DISCUSSION

1- Incidence:

It is clear from the present study , that Rota Virus play an important role in the aetiology of acute diarrhea in children.

39% of our patients with gastroenteritis had Rota Virus antigen detected in their stool. The incidence is similar to that reported from India, u. K. , Bulgaria and Iraq (Hart and Ibrahim 1989, Al-Naqshabandi 1993).

2-Age:

Present study revealed that peak age incidence for Rota Virus gastroenteritis is between 6-18 month of age , it is less frequent in the first 6 months of life and this may be due to exclusive or partial breast feeding in the first 6 months , also transplacental acquired immunity may prevent infection in the first months of life.

The lower incidence of Rote Virus gastroenteritis in children over 18 months of age might be due to acquired immunity from previous infection (Uhnoo et al 1986, Dutta et al 1990) .

Shephered et al 1975 observed high incidence of Rota Virus gastroenteritis in the first 6 months of life because most if their patients were on bottle milk .

Our results are consistent with other studies done by person et al 1982, Nabeel 1986 and Dutta et al 1990 probably due to similar feeding practice.

3-Sex:

Present study showed higher incidence among males 1.6:1. This result agrees with that of Dutta et al 1990 .

4-Seasonal variations:

Through out the year Rota virus was detected in the stool of children with acute gastroenteritis but more cases were seen in winter and early spring 38.46% and 25.64% respectively, these results are consistent with those reported from England and Australia (Bryden 1974, Bartet et al 1985). They observed that 50% of cases were in cooler months.

The presence of Rota Virus gastroenteritis though out the year may be due to mode of transmission by fecal-oral route, while winter peak could be due to additional droplet infection via respiratory tract.

5-Clinical features:

Present study showed that vomiting as first clinical symptom in 60% of patients and diarrhea in 40%. Similar incidence is seen in a previous report which described vomiting in 50-55 % of cases as first symptom with Rota Virus gastroenteritis (Shephered et al 1975).

Early and frequent occurrence of vomiting in the course of the illness is explained by invasion of the upper part of small intestine with Rota Virus (Bishop et al 1975).

Brabhan et al 1992 have shown that Rota Virus gastroenteritis is accompanied by abnormal gastric motor function , and

this abnormality may be the cause of vomiting.

In the present study pyrexia was recorded in 80% of cases , and in 25% of febrile children the temperature was above 39 C.

This is in line with studies done by Tallet at al 1977, Uhnoo et al 1986 in which 85% of Rota Virus gastroenteritis were febrile ,and in the latter study in 42% temperature was above 39 C. Ruuska and Vesikari 1990 recorded similar observation , as in the present study , that most of the children were febrile , but only 14% of cases had fever more than 39 C. Respiratory symptoms are frequently seen with Rota Virus gastroenteritis and 46.15% of our cases had such symptoms.

Lewis et al 1979 , Maki 1981 , Ellis et al 1984 had similar observations , but in a higher percentage. The causal relationship between respiratory and gastrointestinal symptoms had not being established as no Rota Virus particles has been isolated from respiratory secretions (Lewis et al 1979). Most of the patients in the present study were mildly dehydrated but sever dehydration was seen in 10% of patients , most cases of severe dehydration were in infants below one year of age .Lewis et al 1979 had a similar observation in that most of the severely dehydrated children were under 18 months of age . Sengupta et al 1981 and Maki 1981 observed mild to moderate dehydration in 42.9% and no patient with severe dehydration.

6-Type of feeding :

This study showed that there is apparent difference in the incidence of Rota Virus gastroenteritis among children with different types of feeding and lowest incidence 15% being among breast fed babies , this is because human milk contains Human Rota Virus specific antibodies and these antibodies are capable of neutralizing Rota Virus antigens(Thouless et al 1977). Yolken et al 1978 observed no difference in the incidence of Rota Virus gastroenteritis among bottle fed babies and mixed feeding. Hansen et al 1985, Hassony and Abdul-Aziz 1989 agreed that breast feeding was effective in reducing the frequency of Rota Virus gastroenteritis.

7- Stool characteristics:

In the present work watery stool was seen in 90%% of cases , loose stool in 10% , yellowish stool in 63.58% and greenish stool in 18.46% whitish in 10.25% , brownish in 3.84% with out obvious blood or mucus. Tallet et al 1977 , Ellis et al 1984 reported similar observation.

Majority of patients in this study had acidic stool 79% and alkaline stool in 21% of cases. The finding of an acidic stool in cases of Rota Virus gastroenteritis could be due to lactose mal absorption (Hyams et al 1981). In the colon the unabsorbed lactose undergoes fermentation by intestinal bacteria producing acid stool (Mitchell and Skeleton 1988). The microscopic examination of stool in the present study , showed that pus cells was seen in 10% , and RBCs in 4.8%.

This is in line with observation of Walker Smith 1978 who reported that stool of patients with Rota Virus gastroenteritis Characteristically had no inflammatory cells , and the finding of such cells, in the stool of Rota Virus gastroenteritis might be due to mixed infection with invasive bacterial pathogen associated with Rota Virus gastroenteritis.

Stool et al 1983 observed higher percentage (24.5%) of cases with inflammatory cells.

8- Treatment:

Intravenous fluid was used in the management of severely dehydrated patients mildly to moderately dehydrated patients were treated with oral rehydration solutions .

SUGGESTIONS

I- All children with acute gastroenteritis ,their stool should be examined for Rota Virus , for purpose of correct diagnosis and proper treatment.

II- Breast feeding should be recommended for infants.
III-Hospitalized children having Rota Virus gastroenteritis should be isolated from other patients to decrease the possibility of nosocomial infection.

Tables

Sex	No. of (+ve) cases	No. of (-ve) cases	Total	%
Male	245	305	550	44. 54%
Female	145	305	450	32. 22%
Total	390	610	1000	39%

Table-1 Acute Rota Virus gastroenteritis in relation to sex

X2=15.7 P < 0.001 H.S.=highly significant

Type of feed	No. of cases tested	No. of positive Cases for RV %		P. Value
Excusive breast feeding	200	30	15%	<0.001 V.H.S*
Bottle feeding	400	170	42.5%	<0.01 H.S.*
Mixed feeding	400	190	47.5%	<0.05 J.S.*

Table-2 Feeding type in infants with Rota virus gastroenteritis

V.H.S = Very Highly Significant

H.S. = Highly Significant

J.S. = Just Significant

Feature	RV Positive Cases %	
-Vomiting (initial symptom)	234	60%
-Diarrhea (initial symptom)	156	40%
-Fever	312	80%
-Below 39 C	234	75%
-Above 39 C	78	25%
-Dehydration		
-Mild	195	50%
-Moderate	156	40%
-Severe	39	10%
-Respiratory symptoms	180	46.15%
-Cough	50	12.82%
-Cough + Nasal discharge	51	13.07%
-Nasal discharge	52	13.33%
-Cough + ear discharge	27	8.96%

Table-3- shows features of Rota Virus gastroenteritis.

Prevalence Of Rota Virus Infection Among Children With Acute Gastroenteritis In Thi-Qar Governorate

RV = Rota Virus

Macroscopic exam. Of the stool	RV Positive Cases %	
Consistency		
- watery	351	90%
- Loose	39	10%
-Colour		
- Yellow	248	63.58%
- Greenish	87	22.31%
- Whitish	40	10.25%
- Brownish	15	3.85%
- Bloody	0	0%
Macroscopic exam. Of the stool	**RV Positive Cases %**	
Pus Cells	39	10%
RBCs	18	4.8%

Table -4 Demonstrates the laboratory features of stool in patients with acute Rota Virus gastroenteritis

Figures

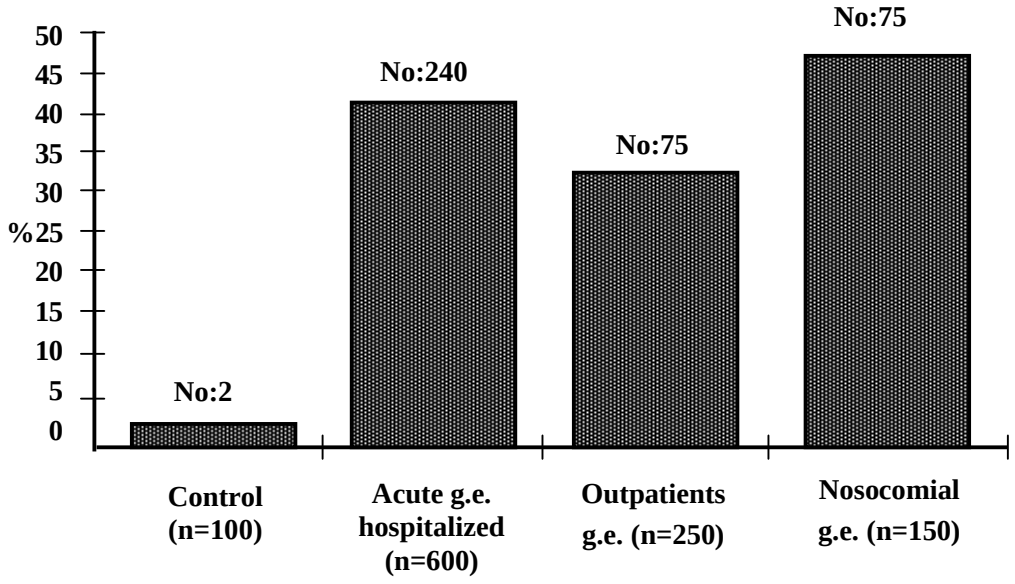

Figure-1 Incidence of Rota Virus infection among all groups .

g.e. = gastroenteritis

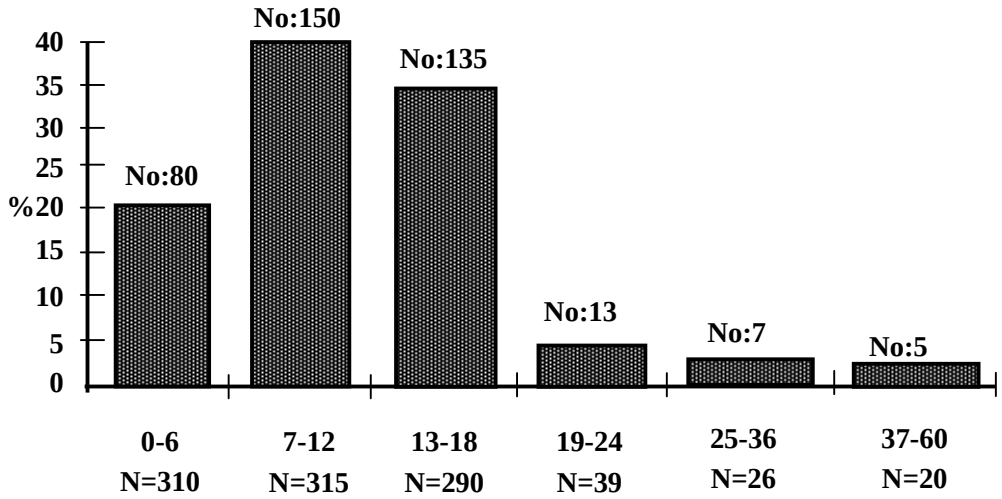

Figure-2 Age distribution of acute Rota Virus gastroenteritis .

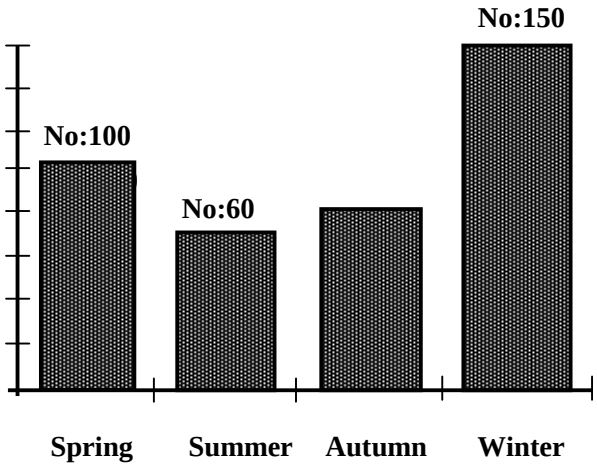

Figure-3 demonstrates the incidence of Human Rota Virus infection in different seasons of the year .

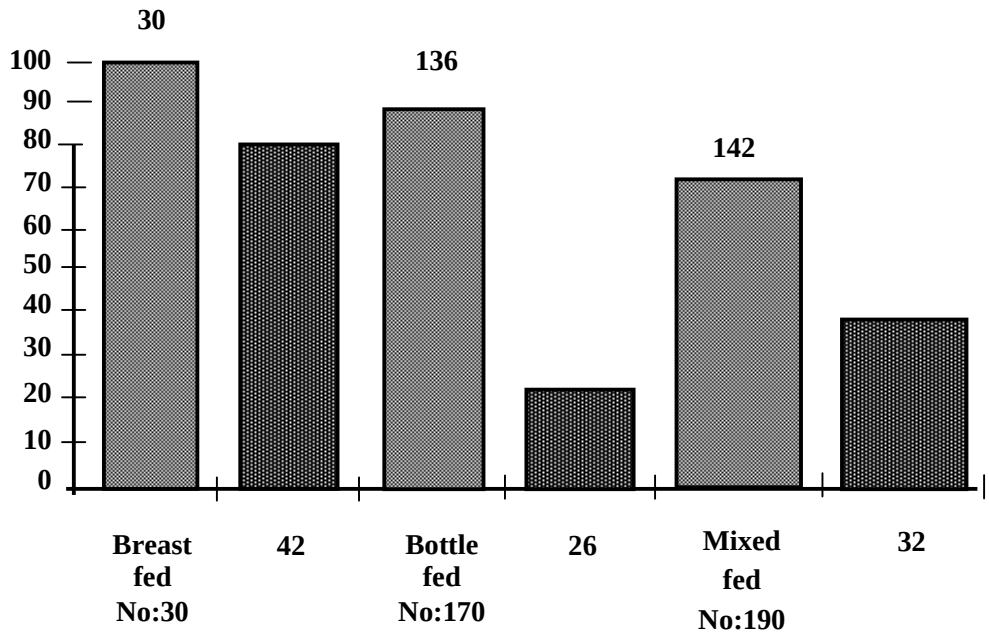

Figure-4 demonstrates stool PH among Rota Virus cases and control group in relation to type of feeding

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دراسة مستوى انتشار الفايروس الدوار المسبب لالتهاب الامعاء الحاد لدى الاطفال في محافظة ذي قار

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الخلاصة

١- تم إشراك (١٠٠٠) مريض تحت عمر دون خمس سنوات مصاب بالتهاب المعدة والأمعاء الحاد ممن راجعوا العيادة الخارجية والمرضى الراقدين في مستشفى الولادة والأطفال التعليمي في الناصرية للفترة من ١٥/ ٣/ ٢٠٠٥ ولغاية ٢٩/ ٢/ ٢٠٠٦ .

٢- تم إشراك (١٠٠) مريض تحت عمر خمس سنوات من الراقدين في المستشفى لأسباب غير التهاب المعدة والأمعاء حيث نم اختيارهم عشوائيا لغرض المقارنة

٣- تم اخذ عينات البراز من الجميع لغرض فحص الفايروس الدوار بواسطة latex agglutination test

٤- كانت الإصابة بالفايروس الدوار (٣٩%) لكل من حالات التهاب المعدة والأمعاء و (٢%) من مجموعة المقارنة .

٥- كانت اغلب الإصابات محصورة في الفئة العمرية بين ٦-١٨ شهر من العمر.

٦- كانت الإصابة اقل عند الأطفال الذين يعتمدون على الرضاعة الطبيعية فقط.

٧- نسبة الإصابة أكثر عند الذكور من الإناث .

٨- تم اكتشاف الفايروس الدوار خلال فترة الدراسة مع زيادة مهمة خلال أشهر الشتاء .

٩- الأطفال المصابين بالفايروس الدوار يملك خصائص سريرية ونتائج مختبرية معينة تساعدنا على التشخيص السريري لهذه الحالات .

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