

PREVALENCE OF INFECTIOUS DIARRHEA AMONG DOGS LESS THAN SIX - MONTHS OLD

By

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ABSTRACT

A total of 148 dogs less than six month of age suffering from diarrhea were examined by viral, bacterial and parasitological methods to detect the infectious cause of diarrhea. Viral causes were detected in (75.7%), bacterial causes were detected in (30.9%), parasitic causes in (41.9%) and mixed infection in (39.7%) and 8.1% proved to be negative to all of the applied tests. Distribution of mixed infection among dogs showed that, the prevalence of viral and parasitic co-infection is the highest prevalence of mixed infection (13.9%) followed by viral and bacterial causes (13.2%). Presence of different causes of diarrhea in different age groups of dogs was studied. Dogs in the study were divided into two groups. The first group aged from one day till three months and the second group aged from three to six month. Highest prevalence % of viral infection was in dogs from 0-3 month (77.7%) than in dogs from 3-6 months (22.3%) and this difference was significant. The prevalence of infectious diarrhea in different sexes were studied and showed that, the highest prevalence of viral infection was in males (60.2%) than in females (39.8%) and this difference was significant. There was insignificant effect of season on the prevalence of infectious causes of diarrhea. Regarding breed susceptibility, Cockaigne, pit bull, German shepherd and Rottweiler showed the highest prevalence of CPV infection. There was insignificant effect of breeds of dogs on the prevalence of different infectious causes of diarrhea. The effect of different managerial factors was studied including feeding, housing, vaccination and deworming of the examined cases. The study showed that, the least prevalence of diarrhea in dogs feeding dry food. There is no impact for housing of dogs indoor and outdoor. Vaccination with Vanguard® had a significant effect in protection against viral diarrhea. Prophylactic deworming shows highly significant effect in the protection against parasitic infection. A trial of treatment was done using supportive and specific therapy for diarrheic dogs. The results showed that, the highest

recovery rate detected in cases of diarrhea caused by parasitic infection (90.4%) and the lowest one was in cases caused by co-infection of viral, bacterial and parasitic infection (33.3%).

INTRODUCTION

Diarrhea is one of the most important life threatening disorders due to dehydration and electrolyte losses especially in young ages, (**Tams 2003, Leib 2005 and Grellet, et al. 2012**), and it is a symptom of several diseases either intestinal or extra intestinal. The character, frequency and appearance of diarrhea may vary widely depending on the etiological agent and affected animals may have other signs including vomiting, lethargy, anorexia, fever, dehydration and abdominal pain. **Schaer (2003)**. Diarrhea in young dogs is caused by several causes which may be infectious or non-infectious. Infectious diarrhea in young dogs has several etiological agents including viral, bacterial and parasitic causes (**Sokolow, et al. 2005**). The most common viral diseases infecting the young dogs causing diarrhea are Canine Distemper virus (CDV), Canine Parvo virus (CPV) and Canine Corona virus (CCV). Canine parvovirus enteritis is an acute highly contagious disease in young dogs (under 1 year). Doberman and Rottweiler are more susceptible than other breeds as reported by **Schaer (2003)**. It is considered to be an important cause of morbidity and mortality in young dogs due to its significant local gastrointestinal and systemic inflammatory sequelae, **Schoeman, et al. (2013)**. **Grellet, et al. (2014)** reported that 14.7% of puppies were excreting CPV2, 20.3% were secreting CCV and only 0.4% presented mixed infection by the two viruses. Canine corona virus is less severe than CPV infection and the disease has extremely low morbidity, **Schaer (2003)**. Mixed infection was reported in several cases and there is a positive correlation between CPV and *E.coli*. This might be due to immunosuppression cause by CPV in the infected dogs **Kumar, et al. (2014)**. The role of enteropathogenic bacteria in canine diarrhea is more complicated and poorly understood and may be present as a complication with other viral or parasitic infections. The most common causes of bacterial diarrhea include enteropathogenic *E.coli*, *Salmonella*, *Campylobacter*, and *Yersenia* and *bacillus piliformis*, **Schaer (2003)**. **Jay-Russell, et al. (2014)** found that, the prevalence of a typical enteropathogenic *E.coli* (EPEC) strains was 3.6% and *Salmonella* was 9.2% in stray dogs while **Puno-Sarmiento, et al. (2013)** reported that, the prevalence of EPEC is 17.6% and EAEC (Effacing and attaching *E.coli*) is 7.4% respectively. Parasite induced diarrhea is one of the important causes of acute and chronic diarrhea in dogs especially in young ages.

Different parasites including Toxocara, Strongyloid, Whipworm, Coccidian and Giardia are incriminated to cause diarrhea in dogs which varied from watery to bloody. Signs of dehydration, weakness, pallor, vomiting, poor growth and anemia may be present, **Schaer (2003)**. **Grellet, et al. 2014** recorded that 77.1% of puppies were infected by at least one virus or parasite and 55.3% carried multiple organisms while 25.9% of puppies infected by Giardia spp., and 22.2% by Toxocara canis. The study was designed to record the prevalence rate of different infectious causes of diarrhea in dogs less than six months old. The effect of breed, age, sex and season on different infectious etiological agents was investigated as well as treatment trial of such cases.

MATERIAL AND METHODS

Animals:

The study was carried out on 148 dogs admitted to military veterinary hospital (Cairo, Egypt), during the period between November 2013 - April 2015. Dogs were belonged to different breeds. They were under six months old and suffering from diarrhea. They were clinically examined and different infectious causes of diarrhea were investigated. Clinical examination was done according to **Ford and Mazzaferro(2006)**. Respiratory rate, pulse rate, temperature, lymph nodes and mucous membranes were recorded for the diseased animals.

Samples:

Fecal samples were collected from clinical cases using sterile dry cotton swabs and investigated for different infectious causes of diarrhea.

1-Virological examination:

Fecal swabs were examined for viral diseases including Canine Parvo virus (CPV) and Canine Corona virus (CCV) using immuno- chromatography assay with commercial kits [WITNESS Parvo (Zoetis), Anigen Rapid CPV/CCV Ag Test Kits (BIONOTE) and Anigen Rapid CPV/CCV/Giardia Ag test kit (BIONOTE)].

2-Bacteriological examination:

Fecal swabs using for bacteriological isolation and identification was done for pathogenic *E.coli* and Salmonella spp. according to **Quinn, et al. (2002)**.

3-Parasitological examination:

Fecal samples were examined for parasitic infestations using direct smear and fecal floatation technique according to **Hendrix and Robinson (2006)**. This was done before and after treatment. Treatment trial was done in diseased cases using fluid therapy as Saline, Ringer's

lactate, Pansol, Panamin - G. Antibiotics as Synulox® (Amoxicillin and Clavulanic acid) 8.75 mg/kg bwt I/M or S/C, i.e. (1ml/20 kg). Baytril® 5% (Enrofloxacin 50mg/ml) 2.5-5 mg/kg bwt, i.e.0.5-1 ml /10 kg for S/C injection. Antiemetic's as Zofran® (Ondansetron) 0.05to 0.5 mg/ lb every 12 hrs. Primperan® (Metaclopramide) 0.2 to 0.5 mg/kg I/M every 8 hrs. Antacids as Zantac® (Ranitidine) 0.25 to 1 mg per pound (0.5-2 mg/kg) I/M every 8 to 12 hrs. Anthelmintic as Drontal plus ® (Praziquantel/Pyrantel pamoate/febantel) tablet /10 kg. Antiprotozoal as septral ®(trimethoprim/sulfonamide) 12.5 to 50 mg per pound (25-10 mg/kg) every24hrs.AntiprotozoalasFlagyl®(Metronidazole)10-60 mg/ kg orally every8 hrs.

Statistical analysis:

Data about age, sex, breed, and season were recorded and to Microsoft Excel 2010® spreadsheet, stored separately and exported to analytical software using Chi-square test. Values of $p \leq 0.05$ were considered significant.

RESULTS

The study was carried out on 148 dogs of different breeds (large and small); they were less than 6 months of age and suffering from diarrhea. These animals were examined for viral infection (Canine parvo virus and canine corona virus). Bacterial examinations for detection of *E.coli* and Salmonella were applied. Parasitic examination was carried out using direct fecal smear and concentration floatation technique. 136 of examined dogs proved to be positive to one or more of the causative agents previously mentioned. Out of 136 positive cases, 103 (75.7%) were positive viral cases, 42 (30.9%) were positive bacterial cases. Parasitic causes were detected in 57 (41.9%) of the animals. Parasites detected were as follow, 11.8% was Giardia,27.9% was *T.canis*,2.9% was *Dipylidiumcaninum*,4.4% was Ancylostoma spp and 1.5% was Isospora spp. (Table 1). Prevalence of co-infection of more than one etiological agent was also detected. (Table 2). The obtained data revealed that viral and bacterial infection were present in 13.2% of the examined dogs while viral and parasitic mixed infection were present in 13.9% of the cases. The prevalence of bacterial and parasitic infection was 3.7%. Viral, bacterial and parasitic co-infection was detected in 8.8% of dogs. The 136 animals that were positive to one or more of the causes of diarrhea were divided into 2 groups. In the first group, the dogs aged from one day to 3 months old (99 dogs, 72.8%) and in the second group, the dogs aged from 3 months to 6 months, (37 dogs, 27.2%). The prevalence of viral infection was 77.7%, bacterial infection was 80.9% and parasitic infection was 70.2% in the first age group. In the second age group, the prevalence of viral

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infection was 22.3%, bacterial infection was 19.1% and parasitic infection was 29.8% (Table 3). The difference between prevalence of viral infection between the 2 age groups proved to be significant using Chi square method ($P \leq 0.05$). Regarding sex impact, the positive animals were divided into male group (88 dogs, 64.7%) and female group (48 dogs, 35.3%). The prevalence of viral, bacterial and parasitic positive animals was 60.2%, 69%, 68.4% respectively in male dogs while it was 39.8%, 31%, 31.6% respectively in females (Table 4). Again there was a significant difference in viral positive group between the two groups. Impact of the season on the prevalence of diarrhea caused by different causes was studied on the 136 dogs infected by one or more of the causes for a period of 2 years. Although variable prevalence values were recorded in the different seasons in all of positive animals to one or more of the causes of diarrhea, statically analysis showed that, the difference in prevalence between seasons is non-significant regardless the cause of diarrhea, (Table 5). The study showed that there is no significant different in the prevalence of diarrhea caused by viral, bacterial and parasitic causes between large and small breeds by statically analysis using chi-square (Table 6). The effect of different management factor including feeding, housing, and vaccination and deworming was studied. Animals were divided according to their feeding practice into three groups, the first group was feeding on fresh food, second group was feeding on dry food and third group was feeding on both fresh and dry food. The difference between the prevalence of infectious diarrhea in the three groups of feeding practice proved to be non-significant as predisposing factors of diarrhea (Table 7). Animals were classified to indoor and outdoor housing management and the prevalence of different infections between the two groups was non-significant (Table 7). Effect of vaccination in animals either vaccinated with single, double doses or non-vaccinated by Vanguard® was studied in animals having viral infection and there was a significant difference between the animals vaccinated and those who had no vaccination (Table 7). Deworming by Drontal plus® also proved to be effective as there was a significant difference between dewormed and not dewormed groups having parasitic infection (Table 7). 136 dogs suffering from diarrhea caused by different infectious causes were subjected for treatment according to the infectious causes responsible for their disease condition some of these animals were suffering from dehydration, vomiting, gastritis beside the diarrhea. The plan of treatment included administration of fluid therapy in the form of Saline 0.9%®, Ringer's lactate®, Pansol® and Pan-Amin G® to those who need it. Antibiotics includes Synulox® and Baytril® were

administrated to animals that in need for it. Antiemetic as Primperan® and Zofran®, antacids as Zantac® were given to dogs that need it. Anthelmintics as Drontal plus®, antiprotozoal as Trimethoprim/ Sulphonamide and flagyl® were administrated in some cases. Vitamin B.complex was also given to some cases. The result of treatment in different cases of diarrhea and the animals that didn't recovered are illustrated in (Table 8).

Table (1): The prevalence of different infectious causes of diarrhea in young dogs.

Breed & No.		Viral		Bacterial		Parasitic						Negative cases**	
breed	No of animals		CPV	CCV	E-coli*	Salmonella	Total parasitic	Giardia	T.canis	D.caninum	Ancylostoma	Isospora	
	Examined	positive											
German sh.	61	55	37	1	20	-	27	8	21	2	4	-	6
Pit bull	23	23	23	-	6	-	4	2	-	-	1	1	-
Rottweiler	17	15	12	-	3	-	7	2	4	1	-	-	2
Golden	16	15	10	-	10	-	7	1	5	1	-	-	1
Griffon	9	9	7	-	-	-	3	-	2	-	1	-	-
Labrador	5	5	4	-	-	-	1	1	-	-	-	-	-
Cockaigne	5	5	4	-	1	-	2	1	2	-	-	-	-
Cocker	4	3	2	-	-	-	3	-	3	-	-	-	1
Husky	3	2	1	-	-	-	1	1	-	-	-	-	1
Others	5	4	2	-	2	-	2	-	1	-	-	1	1
Total	148	136	102	1	42	-	57	16	38	4	6	2	12
%		91.9	75	0.7	30.9	0	41.9	11.	27.	2.9	4.4	1.5	8.1
		%	%	%	%	%	%	8%	9%	%	%	%	%

* Serotypes of *E.coli* identified were O157, O158, O146, O126,O26, O27,O8,and O18.

** Gave negative results to all of the applied tests.

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Table (2): Prevalence of mixed infections of diarrhea in young dogs.

Breed	No of animals		Viral and bacterial		Viral and parasitic		Bacterial and parasitic		Viral, bacterial and parasitic	
	Positive a	%	No.	%	No.	%	No.	%	No.	%
German sh.	55	40.4%	7	38.9%	8	42.1%	3	60%	6	50%
Pit bull	23	16.9%	6	33.3%	4	21%	-	0%	-	0%
Rottweiler	15	11%	1	5.5%	4	21%	-	0%	1	8.3%
Golden	15	11%	3	16.6%	0	0%	1	20%	4	33.4%
Griffon	9	6.6%	-	0%	1	5.3%	-	0%	-	0%
Labrador	5	3.7%	-	0%	-	0%	-	0%	-	0%
Cockaigne	5	3.7%	-	0%	-	0%	-	0%	1	8.3%
Cocker	3	2.2%	-	0%	2	10.5%	-	0%	-	0%
Husky	2	1.5%	-	0%	-	0%	-	0%	-	0%
Others	4	2.9%	1	5.5%	-	0%	1	20%	-	0%
Total	136		18	13.2%	19	13.9%	5	3.7%	12	8.8%

Table (3): Distribution of different causes of diarrhea in different age groups of dogs.

Age	*Positive animals	%	viral				Bacterial				Parasitic			
			No.	%	P-value	Chi-square	No	%	P-value	Chi-square	No.	%	P-value	Chi-square
0 - 3 months	99	72.8%	80	77.7%	5.096	*0.024*	34	80.9%	2.042	.153	40	70.2%	.340	.560
3 - 6 months	37	27.2%	23	22.3%			8	19.1%			17	29.8%		
Total no.	136		103	75.7%			42	30.8%			57	41.9%		

* Positive to one or more of the causes of diarrhea.

** Significant difference between the two positive viral age group ($P \leq 0.05$).

Table (4): The prevalence of infectious diarrhea in different sexes of young dogs.

Sex	*Positive animals	%	Viral				Bacterial				Parasitic			
			No.	%	P-value	Chi-square	No.	%	P-value	Chi-square	No.	%	P-value	Chi-square
Male	88	64.7 %	62	60.2 %	3.784	**0.05	29	69 %	.502	.479	39	68.4 %	.593	.441
Female	48	35.3 %	41	39.8 %			13	31 %			18	31.6 %		
Total no.	136		103	75.7 %			42	30.8 %			57	41.9 %		

*Positive to one or more of the causes of diarrhea.

** Significant difference between the two groups positive to viral causes ($P \leq 0.05$).

Table (5): Effect of season on the prevalence of infectious diarrhea in young dogs.

Season	*Positive animals	%	Viral				Bacterial				Parasitic			
			No.	%	P-value	Chi-square	No.	%	P-value	Chi-square	No.	%	P-value	Chi-square
Autumn	34	25 %	26	25.2 %	.644	.886	9	21.4%	1.691	.639	15	26.3 %	.681	.878
Winter	49	36 %	36	35 %			18	42.9%			22	38.6 %		
Spring	47	34 %	37	36 %			14	33.3%			18	31.6 %		
Summer	6	4.5 %	4	3.8 %			1	2.4%			2	3.5 %		
Total no.	136		103	75.7 %			42	30.8%			57	41.9 %		

* Positive to one or more of the causes of diarrhea.

No significant different was detected in the prevalence of infection between different seasons.

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Table (6): Prevalence of infectious diarrhea in different breeds of dogs.

Breed	No of animals		Viral				Bacterial				Parasitic			
	*positive	%	No.	%	P-value	Chi-square	No.	%	P-value	Chi-square	No.	%	P-value	Chi-square
Large Breed	124	91.2 %	94	91.3 %	0.004	0.950	42	100 %	5.881	.015	51	89.5 %	.354	.552
Small Breed	12	8.8 %	9	8.7 %			-	0 %			6	10.5 %		
Total no.	136		103	75.7 %			42	30.8 %			57	41.9 %		

* Positive to one or more of the causes of diarrhea.

No significant difference was detected at ($P \leq 0.05$)

Table (7): Effect of management on the prevalence of infectious diarrhea in young dogs.

Management		Positive animals	%	Viral				Bacterial				Parasitic			
				No.	%	P-value	Chi-square	No.	%	P-value	Chi-square	No.	%	P-value	Chi-square
Feeding	Fresh food	92	67.6 %	71	69 %	0.325	0.850	27	64.3 %	0.901	0.637	38	66.7 %	0.138	0.637
	Dry food	15	11.1 %	11	10.7 %			4	9.5 %			6	10.5 %		
	Fresh & dry food	29	21.3 %	21	20.3 %			11	26.2 %			13	22.8 %		
Housing	indoor	116	85.3 %	87	84.5 %	0.232	0.630	35	83.3 %	0.186	0.666	48	84.2 %	0.092	0.762
	Outdoor	20	14.7 %	16	15.5 %			7	16.7 %			9	15.8 %		
*vaccination history	One doses	44	32.4 %	28	27.2 %	6.588	***0.037	16	38 %	1.022	0.600	17	29.8 %	0.661	0.718
	Two doses	26	19.1 %	19	18.4 %			8	19.1 %			10	17.6 %		
	Not vaccinated	66	48.5 %	56	54.4 %			18	42.8 %			30	52.6 %		
Deworming	Deworming	51	37.5 %	39	37.9 %	0.024	0.877	19	45.2 %	1.552	0.213	10	17.5 %	16.674	*0.00
	Not dewormed	85	62.5 %	64	62 %			23	54.8 %			47	82.5 %		

*Vaccination was carried against, CDV, CPV, PI3, C. Adeno 2, CCV and Leptospira (canicola and Icterohaemorrhagiae), Vanguard®

**Deworming Using Praziquantel, pyrental and febantel (Drontal plus).

*** $P \leq 0.05$ (Significant).

**** $P \leq 0.05$ (Significant).

Table (8): Results of treatment of infectious diarrhea in young dogs.

Type of infection	Treatment	Total No.of cases	No. of recovered cases*		No. of death cases	
			No.	%	No.	%
Viral infection	1-Fluid therapy 2-Antibiotic 3-Antiemetic 4-Vitamin B complex	54	45	83.3 %	9	16.4 %
Bacterial infection	1-Antibiotic 2-Antiemetic	7	5	71.4 %	2	28.6 %
Parasitic infection	1-Anthelmintic 2-Antiprotozoal 3-Sulfonamide.	21	19	90.4 %	2	9.5%
Viral & bacterial	1-Fluid therapy 2-Antibiotic 3-Antiemetic 4-Vitamin B complex	18	11	61.1 %	7	38.9 %
Viral & parasitic	1-Fluid therapy 2-Antibiotic 3-Antiemetic 4-Vitamin B complex 5-Anthelmintics.	19	14	73.7 %	5	26.3 %
Bacterial & parasitic	1-Antibiotic 2-Antiemetic 3-Anthelmintics.	5	4	80%	1	20%
Viral&bacterial & parasitic	1-Fluid therapy 2-Antibiotic 3-Antiemetic 4-Vitamin B complex 5-Anthelmintics.	12	4	33.3 %	8	66.7 %

*Recovered cases proved to be clinically normal.

DISCUSSION

Diarrhea is one of the most complaints faced by canine practitioners with variable prevalence. Moderate or severe diarrhea lead to a variety of disease conditions such as dehydration, electrolyte and acid-base disturbances and hypovolemic shock young dogs less than six months of age are susceptible to hypokalemia, hypochloraemia and hyponatremia. Metabolic acidosis develops secondary to loss of intestinal bicarbonate and dehydration leading to hypovolemic shock. Death associated with many severe diarrheal disorders is not due to the primary cause but secondary to fluid imbalance (Leib 2005). In this study, 148 dogs of

different breeds and less than six months of age were examined for presence of diarrhea. They were subjected to viral, bacterial and parasitic examinations to detect causes of infectious diarrhea. 12 animals (8.1%) of the examined dogs gave negative results to all of the applied tests (Table 1). Canine parvo virus and canine corona virus as a main viral cause of infectious diarrhea appeared to be the more prevalent cause of infectious diarrhea among the 148 examined dogs (Table 1). Viral causes are responsible for diarrhea either alone or in a mixed condition with other pathogens. CPV was the main viral agent detected in diarrheic dogs (75%) while CCV was detected in one case of viral positive dogs (Table 1). Most of the examined dogs are kept indoors as a single owned dog and that might explain the low CCV prevalence % as **Rimmelzwaan, et al. (1991)** stated that CCV are highly prevalent in dogs kept in remedies and animal shelters. Bacterial examinations were applied on diarrheic dogs to detect *E.coli* and *Salmonella* organisms if present. (Table 1), showed that 30.9% of examined dogs with diarrhea were positive to *E.coli*. Serotypes of the isolated strains of *E.coli* were identified to be O157, O158, O146, O126, O26, O27, O8, and O18. Golden retriever and German shepherd were the breeds that harbor *E.coli* more than other breeds of dogs examined in the study. No *Salmonella* isolates were detected among infected dogs; this may be due to that there is no association between isolation of *Salmonella* and clinical diarrhea (**cantor, et al. 1997**). However, the role played by bacteria other than *E.coli* in induction of diarrhea in young dogs is not well understood especially with *Salmonella* organisms (**Verma, et al. 2007**). Also **Hammermueller, et al. (1995)** stated that several bacterial pathogens have been associated with diarrheic illness in dogs. Among the parasitic causes of diarrhea, *T.canis* was the most common parasite detected with the prevalence % of 27.9% followed by *Giardia* 11.8% then *Ancylostoma caninum* 4.4% and much less prevalence % for the rest of the examined parasites (Table 1). **Anene, et al. (1996)** and **Coggins (1998)** recorded that *T.canis* was the most common parasite found in puppies. (Table 2), showed the prevalence of diarrhea caused by mixed infectious causes, it is clear that diarrhea caused by viral and parasitic organisms are the highest prevalence of mixed infection detected in this study followed by mixed infection of viral and bacterial infection. Distribution of different causes of diarrhea in different age groups of dogs were examined, (Table 3). The results showed that, the highest prevalence % of diarrhea were among dogs from one-day old till three months. The highest prevalence of viral infection found in dogs from 0-3 months than in dogs from 3-6 months proved to be true and significant. **Adesiyun, et al. (1997)** reported that, the prevalence of

E.coli and *Salmonella* not associated with age, this was detected in our study as the difference between prevalence of bacterial infection proved to be non-significant. Increased susceptibility of CPV was reported in dogs less than 6 months of age and this was reported by **Houston, et al. (1996)**. Weaned puppies are at increased risk for CPV enteritis as enterocytes in these puppies have mitotic index due to diet change and changes in bacterial flora and this were also reported by **Hoskins (1998)**. Higher prevalence of viral infection was detected in males than in females and this difference was found to be significant. However, **Coggins (1998)**, **Ramirez-Barrios, et al. (2004)** and **Martinez-Moreno, et al. (2007)** stated that there is insignificant difference in overall prevalence between males and females. Although variable percentage of diarrhea caused by different causes was detected in the different seasons. The statistical analysis proved that, the season has no significant effect in the prevalence of infectious diarrhea. These results come in agreement with those reported by **Kalli, et al. (2010)** and **Rakha, et al. (2015)**. This study showed that large number of viral diarrhea was present in large breed of dogs, (Table 6). **Mosallanejad, et al. (2008)** reported that CPV were prevalent in terriers and German shepherd breeds than other breeds. However, the difference between large and small breeds was non-significant. The impacts of different methods of management were studied; (Table 7) showed that animals were divided according to feeding management into 3 groups i.e. feeding fresh food, dry food and both fresh and dried food. No possible effect was detected between the different groups as there was no significant difference was found. Regarding housing of the dogs, no clear difference was detected between dogs kept indoors or out door. Vaccination history of diseased dogs was obtained from the owners of the animals and was recorded as vaccination by one or two doses of vaccine (Table 7) and this was not done by the authors of this work. Vaccination of dogs with two doses against CDV, CPV, PI3, CCV and C.Adeno2 had a significant effect in protection against viral diarrhea when compared with other non-vaccinated dogs. Deworming of young dogs is usually applied as a prophylactic means against parasitic infection. Our results showed that there was clear impact of the deworming procedures as the number of dogs that received anthelmintic was less than those not dewormed, (Table 7) and this difference proved to be highly significant. A trial of treatment was done using specific and supportive therapy for diarrheic dogs. Treatment was commenced as soon as possible after rapid diagnosis of the infectious causes of diarrhea. This was beginning by withdrawal of food for 24 hours and followed by administration of the recommended treatment. Results illustrated in (Table 8)

showed that, the highest rate of recovery (90.4%) was in cases of diarrhea caused by parasitic causes whom received anthelmintic (Drontal plus), Antiprotozoal (Flagyl) and Sulphonamide. This is followed by 83.3%. Recovery rate encountered in cases of viral diarrhea. These animals were given fluid therapy, antibiotic, antiemetic and vitamin B. complex. The lowest rate of recovery was detected in animals suffering from diarrhea caused by co-infection of viral, parasitic and bacterial (33.3%). (Table 8), regardless the intensive course of treatment they received. Consequently, the highest case fatality (66.7%) was recorded in these groups of dogs.

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