



# Savannah Veterinary Journal



Original article

## Prevalence and clinical manifestations of gastrointestinal parasites infection in dogs in Abeokuta

<sup>a</sup>Abakpa S.A.V., <sup>a</sup>Ebite W.O.N., <sup>b</sup>Akintunde G.O., <sup>c</sup>Olasoju M.I., <sup>d</sup>Idowu K.R., <sup>a</sup>Fambegbe T.J., <sup>a</sup>Okpe E.F. and <sup>e</sup>Makinde A.F.

<sup>a</sup>Department of Veterinary Medicine, College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Nigeria.

<sup>b</sup>Department of Veterinary Physiology and Biochemistry, College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Nigeria.

<sup>c</sup>Department of Public and Preventive Medicine, College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Nigeria.

<sup>d</sup>Department of Animal Health and Production, College of Animal Science and Livestock Production, Federal University of Agriculture, Abeokuta, Nigeria.

<sup>e</sup>Veterinary Teaching Hospital, College of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Nigeria.

### ARTICLE INFO

#### Article history:

Received: May 07, 2023

Received in revised form: June 25, 2023

Accepted: June 26, 2023

#### Keywords:

Clinical signs,  
Dogs,  
Parasites,  
Prevalence

### ABSTRACT

**Introduction:** Gastrointestinal parasites of dogs are of global concern, especially those that are of zoonotic importance in developed and developing countries, being companion animals. This research determined the prevalence and clinical manifestations of gastrointestinal parasites in dogs, in Abeokuta and its environs.

**Method:** Faecal samples collected from sick and apparently healthy dogs presented at the veterinary Teaching hospital (VTH), Federal University of Agriculture, Abeokuta (FUNAAB), and private kennels were analyzed using Centrifugal floatation and the morphology of the eggs and oocyst viewed under the microscope. Data generated were analyzed with descriptive statistics and the Chi-square test was used to determine the association between variables.

**Results:** Out of the 158 dogs screened, 80 (50.6%) were positive for various intestinal parasites. Helminthic infection was the highest with *Ancylostoma caninum* infection being the most prevalent (39%). Infection due to helminth was highest in dogs between 1 and 3 years. Isospora infection was prevalent in ages below 1 year followed by 1 – 3 years, but absent in dogs above 3 years. Hunting dogs (%) were mostly infected compared with confined or semi-confined dogs but without protozoan infection. Dull or rough hair coat was the most frequently observed clinical sign in dogs with intestinal parasites. In conclusion, gastrointestinal parasitic infection mostly, *Ancylostoma caninum*, is highly prevalent among dogs in Abeokuta and environs. Isosporaa infection was absent in hunting dogs and ages above 3 years.

**Significance:** Dog owners need to be educated on the importance of routine veterinary care of their dogs to reduce the load of intestinal parasites.

@ 2023 Faculty of Veterinary Medicine, University of Ilorin, Nigeria. All rights reserved.

## Introduction

Canine species, most especially the domestic dog (*Canis familiaris*) are the most common pet animals worldwide and perform cultural, social, religious, and economic functions (Schurer *et al.*, 2013). Humans and dogs enjoyed a close relationship for thousands of years appearing as a special bond. Many people keep dogs for different purposes ranging from companionship, and security to the provision of dietary proteins. Dogs are infected with different intestinal parasites mostly *Ancylostoma caninum*, *Toxocara canis*, *Dipylidium caninum*, *Trichuris vulpis*, and *Echinococcus* spp (Ayinmode *et al.*, 2016). *Isospora* spp also plays an important role as part of the intestinal parasites of dogs but with low prevalence (Ezema *et al.*, 2019). With the increasing number of companion animals, there is more contact between domestic animals and people, exposing humans to zoonotic agents (Lorenzini *et al.* 2007). Gastrointestinal parasitic infections are the most commonly encountered diseases in dogs and act as a major constraint in dog keeping across the globe (Saini *et al.*, 2012).

Gastrointestinal parasitic infections in dogs may be asymptomatic or cause gastrointestinal disorders, lack of appetite, loss of weight, mucoid diarrhea, vomiting, potbelly, emaciation, retarded growth, and in severe cases death (Panigrahi *et al.*, 2014).

The human-animal bond can provide substantial positive benefits concerning the emotional development, socialization, and physiological well-being of humans (McGlade *et al.* 2003). However, this relationship is not devoid of some risks emanating from zoonotic diseases, including some gastrointestinal parasitic diseases. These zoonotic diseases are of public health importance worldwide (Millan *et al.*, 2013). Much attention has not been given to these diseases especially, in developing countries like Nigeria, where many studies have not been done on the prevalence of these diseases in dogs. Dog-keeping activities are potential risk to the transmission of zoonotic diseases, some of which could be of parasitic origin, in densely populated areas such as urban and peri-urban areas (Kahante *et al.*, 2009). It is expedient to be equipped with current information on the prevalence of gastrointestinal parasites which will assist in the

\*Corresponding author Tel: +2348032832801; email address: [abakpasav@funaab.edu.ng](mailto:abakpasav@funaab.edu.ng)

development and modification of control measures being practiced in both animals and public health. There is also the need to reduce the existing gap in inter-professional collaboration between human and animal health professionals, as well as poor awareness among the human population. It is also worthy of note that only few reports have focused on the infection risk of the population living in rural and sub-urban settings where the majority of dogs defecate indiscriminately. Many of these villages, towns, and cities have large populations of such free-roaming domestic dogs and limited access to veterinary services. There are various reports on the endemicity of gastrointestinal parasitic infections and their public health importance across the world both in humans and animals (Hailu *et al.*, 2020; Kann *et al.*, 2020) and Nigeria inclusive (Moro & Abah, 2019; Olatunji, 2020), but not much on the clinical manifestations presented by the dogs. This study determined the prevalence and clinical signs of gastrointestinal parasitic infections in dogs, in Abeokuta.

## Materials and methods

### Study Area

This study was carried out in the Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta, and surrounding rural settings, Ogun State, Nigeria. Ogun State is a transitional zone between the tropical rain forest and derived savanna zone in the south-west of Nigeria and is located between latitude 70° 3' 39" N and longitude 30° 20' 54 E. Nigeria has a diverse climate ranging from tropical areas of the coast to the arid zone of the North situated on the Gulf of Guinea in West Africa. It is bordered by Benin Republic in the West, Niger in the North, Cameroun in the East, and Chad in the North East (Macrotrends, 2021).

### Study design

A descriptive study design was conducted to determine the prevalence of endoparasites and associated clinical manifestations in dogs in Abeokuta and its environs. Samples of fresh faeces were collected from pets and hunting dogs disregarding sex, age, or breed.

### Sampling procedure

A total of hundred and fifty-eight faecal samples were randomly collected from dogs presented at the Veterinary Teaching Hospital, the Federal University of Agriculture, Abeokuta (FUNAAB), and private kennels comprising 71 males and 87 female samples, after seeking their consent. In cases where samples were difficult to obtain utilizing fingers, swab sticks were inserted into the rectum to access the faecal materials. The samples were placed in sterile plastic containers preserved with 5% formaldehyde and transported to the parasitology laboratory of the Department of Parasitology and Entomology for storage at 40C and analyzed within 48 hours.

### Copro-parasitological analysis

The macroscopic examination was first performed for the detection of proglottids of cestodes or adult worms. Faecal samples were examined for intestinal parasites with the centrifugal floatation technique. The eggs and oocysts found were identified according to morphological characteristics under light microscopy.

### Faecal centrifugal flotation

A small number of fresh faeces about 2.0 g, was added to 10 ml of the flotation solution, and following thorough mixing and sieving, the suspension is poured into a test tube and centrifuged using a bucket centrifuge at 2000rpm for five minutes. More flotation solution was added to fill the test tube forming a reverse meniscus and a cover slip was then placed on top of the surface of the liquid and the tube. The test tube and cover slip were left standing for 5 minutes. The cover slip was then lifted and placed on a glass slide and examined under the microscope. The observations were recorded after viewing the slides under the microscope at (X10) objective and confirmation was made with (X40).

### Ethical Approval

Ethical approval was obtained from the Federal University of Agriculture, Abeokuta, College of Veterinary Medicine Board Committee (COLVETBC). The proposal was subjected to screening to ensure adequate care to the animals and appropriate standard animal welfare monitoring (FUNAAB/COL-VET/15/3803)

### Data analysis

Microsoft Excel sheet was used to compile the raw data obtained. This data was further subjected to descriptive statistical analysis using percentages to describe the prevalence rates across different ages and sex using Statistical Package for Social Sciences (SPSS) version 23 running on Windows version 10 with  $p \leq 0.05$  considered significant

## Results

### Prevalence of gastrointestinal parasitic infection

Out of the total number of 158 dogs screened, 80 (50.6%) were positive for intestinal parasites (helminths and protozoans). Out of 71 males screened, 32 (40%) were positive for the parasites while 48 (60%) were positive among the 87 females sampled. There was no significant difference ( $p > 0.05$ ) between the male and female dogs infected with intestinal parasites. Dogs infected with only protozoan were 8 (5.1%) while 72 (45.6%) were infected with only helminths. The helminthic infection in dogs was significantly higher ( $p < 0.05$ ) than that of the protozoan infection (Table 1).

### Prevalence of individual parasites in the study population

Among the various parasites detected in the dogs within the studied population, *Ancylostoma caninum* had the highest percentage 52 (39%). *Toxocara* spp infection was next to

*Ancylostoma* spp infection with 25 (15.8%) prevalence, while others were *Taenia* spp 17 (10.8%), *Isospora* spp 8 (5.1%), *Toxascaris* spp 6 (3.8%), *Diphylobothrium* spp 5 (3.2%), and *Dipylidium* spp 2 (1.3 %) in decreasing order.

#### *Prevalence of gastrointestinal parasitic infection among the age groups*

Helminthic infection was highest in the age group between one and three years while the age group below one year had the lowest prevalence rate. Protozoan infection was highest in dogs below 12 months of age, but absent in the age group above 3 years (Figure 1).

#### *Prevalence of gastrointestinal parasites based on activities and housing systems*

Infection in hunting dogs was significantly high ( $p < 0.05$ ) compared to those confined or partly confined. Out of the 78 hunting dogs screened, 62 (91.2%) were infected with different parasites. Confined dogs had a significantly low prevalence compared with hunting and partly confined dogs. Only 9 (11.8%) out of the 76 sampled dogs were infected. Protozoan infection was seen mainly in confined dogs and a few in partially confined dogs (Figure 2).

#### *Clinical manifestations presented by dogs with intestinal parasites*

A diverse manner of clinical signs was manifested by dogs that were positive for intestinal parasites. Rough hair coat and dull

coat ranked high above all the clinical signs observed. Unthriftiness, pot belly, and diarrhoea with tarry faeces were the lowest clinical signs (Figure 3).

## Discussion

Intestinal parasite infection is a big challenge in small animal practice especially, canine practice (Raza *et al.*, 2018). Previously, there have been various reports of the prevalence of 31.5% in Zaria (Ehimiyen, 2018) and 31.5% in Maiduguri (Ezema, *et al.*, 2019), in Northern Nigeria. Others were 58.2% in Ibadan, Oyo (Adejimi *et al.*, 2010), 56.1% in Enugu (Idika, 2017), and 61.4% in Lagos (Olatunji, 2020), in Southern Nigeria. In this study, we recorded a high prevalence of 50.6% which is consistent with previous reports from the southern part of Nigeria. The trend in the prevalence of gastrointestinal parasites is that, it is relatively high in southern Nigeria compared with the northern part of the country. The findings might be attributed to favourable weather conditions that facilitate the developmental stages of the parasite outside its host. The favourable environmental conditions resulting from frequent rainfall, increased temperature and humidity, rich vegetation, and poor drainage systems around urban areas provide an increased rate of hatchability for helminth eggs and also create an easy avenue for contact between infectious agents and dog populations.

Table 1: Prevalence of gastrointestinal parasites infection of dogs in Abeokuta

Status	No. of samples	Infected	Prevalence (%)	P-value ( $\leq 0.05$ )
No. of dogs	158	80	50.6	
Protozoan	158	8	5.1	0.000
Helminth	158	72	45.6	
Sex				
Males	81	32	40	
Females	87	48	60	0.206

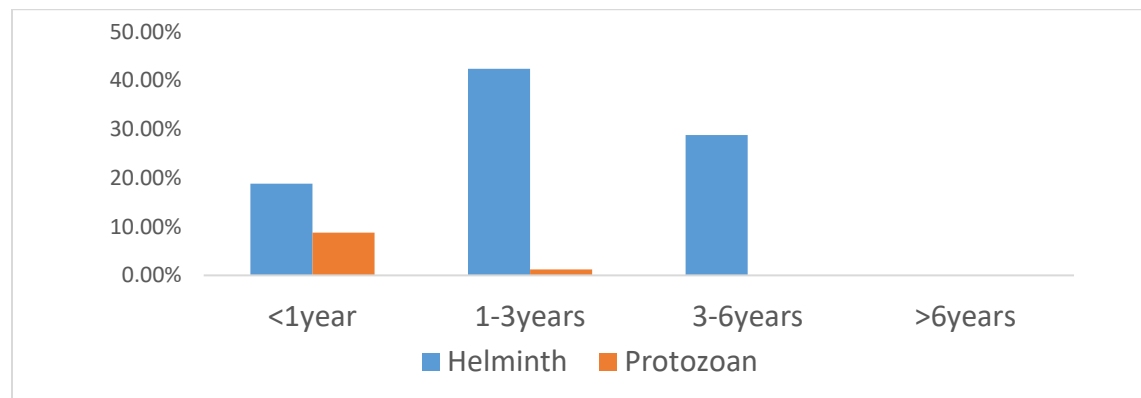


Figure 1: Prevalence of helminths and protozoan infection within the age groups

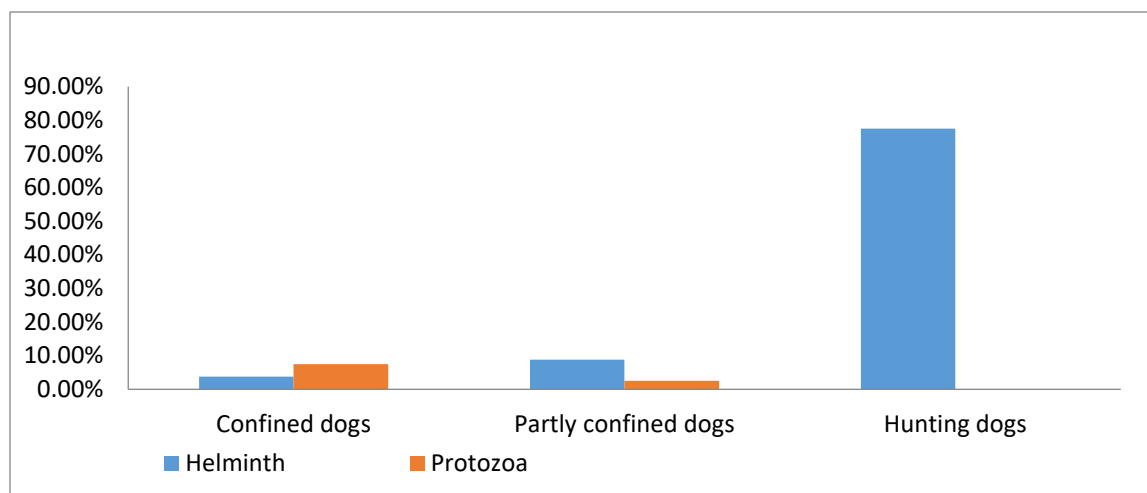


Figure 2: Prevalence of helminthic and protozoan infections concerning activities and housing systems.

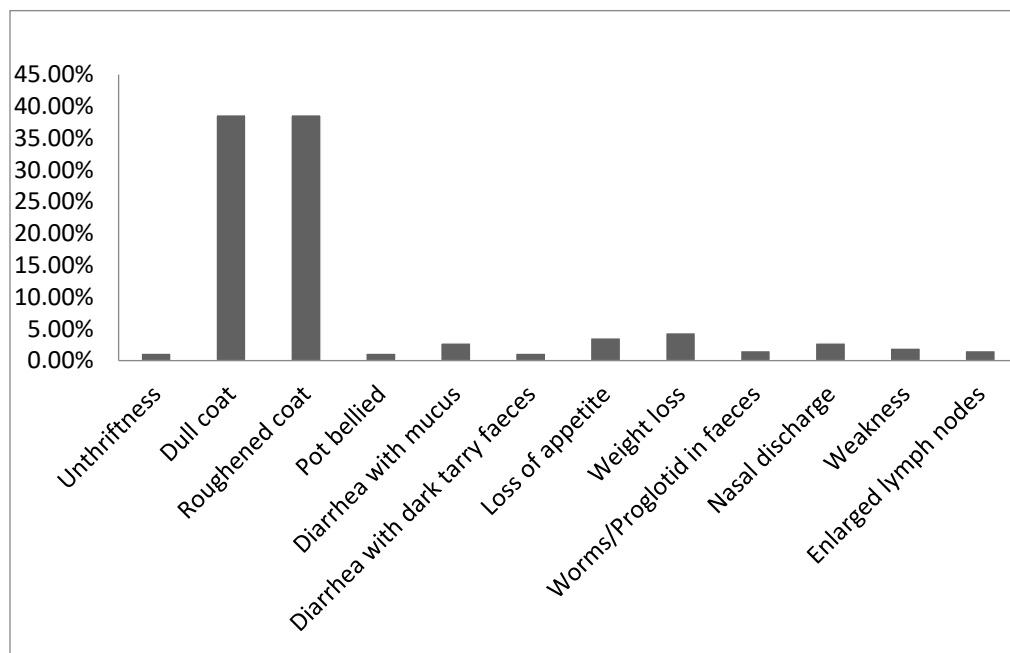


Figure 3: Some clinical signs presented by dogs with gastrointestinal parasitic infections

## Discussion contd.

The protozoan infection recorded in this study was *Isospora* spp. with a prevalence of (5.1%) and detected mainly in ages below 1 year. The prevalence is low compared with the 11.7% and 20.6% reported by Adejinmi and Osayomi, (2010), in Ibadan, Nigeria, and Mekibib and Sheferaw, (2018), in Hawassa, Ethiopia, respectively. However, the prevalence observed is higher than the report of Faraguna *et al.*, (2023), who reported a prevalence of 2.5% in Croatia. The high prevalence observed in the young dogs corroborates the reports of other authors who have severally reported such high prevalence (Mekibib and Sheferaw, (2018); Faraguna *et al.*, (2023).

In this study, the prevalence of *Ancylostoma* spp (33.5%) was higher than all other species of detected intestinal parasites. This finding corroborates the reports of researchers who reported that *Ancylostoma* spp was the highest prevalent and commonly encountered parasite of dogs in Nigeria and Sub-Sahara Africa (Idika *et al.*, 2017; Chidumayo, 2018; Ezema *et al.*, 2019). This might be due to the transmission efficacy of the parasite which could be through skin penetration and migration by the infective larva, trans-mammary transmission, or ingestion in food or water. Traversa, (2012), reported that females of *Ancylostoma* spp. are very prolific and dogs can become infected in many ways so it is presumed that it is almost impossible to prevent infection of dogs in endemic areas. Other intestinal parasites detected in this study were *Toxocara* spp (15.8%), *Taenia* spp (10.8%), *Isospora* spp (5.1%), *Toxoascaris* spp (3.8%), *Dipyllobothrium* spp. (3.2%) and *Dipylidium* spp. The species of helminth and protozoa detected in this study have been the common intestinal parasites of dogs frequently observed by other researchers (Ezema *et al.*, 2019; Faraguna *et al.*, 2023). These parasites including the zoonotic ones have become a concern in veterinary and medical practice in prevalent areas worldwide.

The prevalence of helminthic parasites in hunting dogs was very high compared with confined or partially confined dogs. This finding is consistent with the study of Olatunji, (2020), who reported a prevalence of 61.4% in stray dogs in Lagos, Nigeria. The activities (free-roaming) of these dogs expose them to different hazards especially, infection available in the roaming environments. It can also be speculated that these dogs are not routinely dewormed thereby making them live with the infection. Interestingly, *Isospora* spp was not detected in the hunting dogs and those above 3 years. This is in variance with the report of Mekibib and Sheferaw, (2018), who reported a prevalence of 20% in stray dogs in Ethiopia. Michael, (2013), reported that adult dogs do not shed *Isospora* spp oocysts. Since it is only adult dogs that are used for hunting, it can be deduced that the above reason holds for the absence of *Isospora* spp in hunting dogs. However, with unpublished contrary reports from the field, more researches need to be conducted to establish the truth.

The prevalence of gastrointestinal parasites in confined dogs was very low compared with the partially confined or hunting dogs. The movement of these dogs is being restricted by the owners and so they are in less contact with infectious agents. One can

also attribute the reason for low prevalence to the awareness of pet owners towards veterinary care, thereby minimizing the rate of infections due to less exposures. Among the different clinical signs observed in this study, roughened and dull hair coats were found to be the most frequent. Dog fur contains protein and depletion of the dogs' nutrients will result to rough and dull hair coat. These clinical signs were higher than the other clinical manifestations because the parasites feed on the protein (albumin) thereby depriving them of utilization for their healthy living. The clinical manifestations observed in this study are consistent with the findings of other authors (Kohansal *et al.*, 2017; Raza *et al.*, 2018).

## Conclusion

In conclusion, intestinal parasitic infections are highly prevalent in Abeokuta and its environs with *Ancylostoma caninum* being the most frequently detected among all the helminths. Hunting dogs are mostly infected with helminthic parasites as compared to dogs raised under the confined or semi-confirmed system of management and were not infected with *Isospora* spp.

## Acknowledgement

The authors appreciate all the staff of the Department of Veterinary Parasitology and Entomology, who assisted us in identifying the parasites. We appreciate all the pet owners who permitted us to take samples from their dogs

## Conflict of interest

The authors declared no conflict of interest.

## References

- Adejinmi, J. O. and Osayomi, J. O. (2010). Prevalence of intestinal protozoan parasites of dogs in Ibadan, southwestern Nigeria. *Journal of Animal and Plant Sciences (JAPS)*, 7(2), 783-785.
- Ayinmode, A. B., Obebe, O. O. and Olayemi, E. (2016). Prevalence of potentially zoonotic gastrointestinal parasites in canine faeces in Ibadan, Nigeria. *Ghana medical journal*, 50(4): 201 - 206
- Chanding, A. Y., Umar, Y. A., Tenshak, T. J., and Ibrahim, S. (2018). Prevalence Study of Gastrointestinal Helminth in Domestic Dogs (*Canis Familiaris*) Slaughtered in Selected Abattoirs in Plateau State, Nigeria. *Open Science Journal*, 3(2).
- Chidumayo, N. N. (2018). Epidemiology of canine gastrointestinal helminths in sub-Saharan Africa. *Parasites & vectors*, 11(1), 1-7.
- Ehimiyein, A. M., Maishanu, D. D., and Ehimiyein, I. O. (2018). Prevalence of gastrointestinal and haemo-parasites in hunting dogs in Zaria, Nigeria. *Sokoto Journal of Veterinary Sciences*, 16(3), 55-60.
- Ezema, K. U., Malgwi, S. A., Zango, M. K., Kyari, F., Tukur, S. M., Mohammed, A., and Kayeri, B. K. (2019). Gastrointestinal parasites of dogs (*Canis familiaris*) in Maiduguri Borno State, Northeastern Nigeria: Risk factors and zoonotic implications for human health. *Veterinary world*, 12(7), 1150.
- Faraguna, S., Vlahek, I., Miočić, S.T., Andreanszky, T. and Pećin, M., (2023). Prevalence of intestinal parasites in dogs and cats

- from the Cvarner region in Croatia. *Acta Veterinaria-Beograd*, 73(1): 41-54. UDK: 636.7/8.09:616.99-084(497.5) DOI: 10.2478/acve-2023-0004
- Hailu, T., Abera, B., Mulu, W., Kassa, S., Genanew, A. and Amor, A. (2020). Prevalence and factors associated with intestinal parasitic infections among pregnant women in West Gojjam zone, Northwest Ethiopia. *Journal of Parasitological Research*, 2020:1–6
- Idika, I. K., Onuorah, E. C., Obi, C. F., Umeakuana, P. U., Nwosu, C. O., Onah, D. N., and Chiejina, S. N. (2017). Prevalence of gastrointestinal helminth infections of dogs in Enugu State, South Eastern, Nigeria. *Parasite epidemiology and control*, 2(3), 97-104.
- Kahante, G. S., Khan, L. A., Bodkhe, A. M., Suryawanshi, P. R., Majed, M. A., Suradkar, U. S., and Gaikwad, S. S. (2009). Epidemiological survey of gastro-intestinal parasites in Nagpur City. *Veterinary world*, 2(1), 22.
- Kann, S., Bruennert, D., Hansen, J., Mendoza, G.A.C., Gonzalez, J.J.C. and Quintero C.L.A. (2020). High prevalence of intestinal pathogens in indigenous in Colombia. *Journal of Clinical Medicine*, 9:2786
- Kohansal, A.H., Fazaeli, A., Nourian, A., Haniloo, A. and Kamali, K. (2017) Dogs' Gastrointestinal Parasites and their Association with Public Health in Iran. *Journal of Veterinary Research*, 61(2): 189–195. doi: 10.1515/jvetres-2017-0024
- Lorenzini G, Tasca T and De Carli GA (2007). Prevalence of intestinal parasites in dogs and cats under veterinary care in Porto Alegre, Rio Grande do Sul, Brazil. *Brazilian Journal for Veterinary Research and Animal Science*, 44: 137-145.
- Macrotrends, 2021. Abeokuta, Nigeria Metro Area Population 1950-2021. Retrieved from: [www.macrotrends.net/cities/21975/abeokuta/population](http://www.macrotrends.net/cities/21975/abeokuta/population)
- McGlade, T.R., Robertson, I.D., Elliot, and Thompson, R.C.A. (2003). Gastrointestinal parasites of domestic cats in Perth, Western Australia. *Veterinary Parasitology*, 117(4): 251-262.
- Michael, R.L. (2013). Isosporiasis. Canine and feline infectious diseases, 82 (4): 793 Amsterdam, Elsevier Inc.
- Millán, J., Chirife, A. D., Kalema-Zikusoka, G., Cabezón, O., Muro, J., Marco, I., Cliquet, F., and Chidumayo, N. N. (2018). Epidemiology of canine gastrointestinal helminths in sub-Saharan Africa. *Parasites & Vectors*, 11(100), 1-7.
- Moro KK & Abah AE (2019). Epizootiology of zoonotic parasites of dogs in Abua area of Rivers State. *Veterinary and Animal Science*, 7:100045.
- Olatunji, O. A. (2019). Prevalence of intestinal helminth infections of stray dogs of public health significance in Lagos metropolis, Nigeria. *International Annals of Science*, 9(1), 24-32.
- Panigrahi, P.N., Gupta, A.R., Patra, R.C., Mohanty, B.N., Maiti, A. and Sahoo, G.R. (2014). Comparative anthelmintic efficacy of ivermectin delivered through different routes in gastrointestinal nematode infected dogs. *Journal of Parasitic Diseases*, 40(1): 46-51.
- Raza A, Rand J, Qamar AG, Jabbar A, Kopp S (2018). Gastrointestinal parasites in shelter dogs: occurrence, pathology, treatment and risk to shelter workers. *Animals*, 8:7
- Schurer, J. M., Ndao, M., Skinner, S., Irvine, J., Elmore, S. A., Epp, T. and Jenkins, E. J. (2013). Parasitic zoonoses: one health surveillance in northern Saskatchewan. *PLoS Neglected Tropical Diseases*, 7(3), e2141.
- Saini, N., Ranjan, R., Singla, L.D., Anand, A. and Radhawa, C.S. (2012). Successful treatment of pulmonary paragonimiasis in a German shepherd dog with fenbendazole. *Journal of Parasitic Diseases*, 36(2):171-174.
- Traversa, D. (2012). Pet roundworms and hookworms: a continuing need for global worming. *Parasites & vectors*, 5(1), 1-19.