RESEARCH ARTICLE Indian Journal of Animal Research, Volume 56 Issue 1: 90-94 (January 2022)

Prevalence and Pathology of Gastrointestinal Parasites in Free Range Pigs

V. Gnani Charitha, K. Venkatesh, C.V. Sesha Reddy, V. Ramya, S.V.R. Sharma

10.18805/IJAR.B-4501

ABSTRACT

Background: Gastrointestinal (GI) parasitism in pigs is often associated with subclinical infections leading to poor weight gain and reduced market value. One of the most significant risks is pigs being the host for many zoonotic parasites and thereby threatening human health. Despite the epidemiological data being available from different states of the country, records from Andhra Pradesh are scanty. Hence, a study was conducted to determine the prevalence of gastrointestinal parasites in free range pigs of Proddatur municipality Andhra Pradesh, India.

Methods: About 142 fecal samples were collected from free range pigs slaughtered in four localities of Proddatur municipality over a period of six months. The fecal samples were later subjected for parasitological examination and the tissue pieces of intestines collected from the slaughtered animals with the embedded parasites and those with pathological changes were subjected to histological staining procedure for identification.

Result: Fecal examination revealed 80.98% (115/142) positivity for parasitic ova or occysts. About eleven species of parasites were identified; of them nine were helminths (83.8%) and two were protozoan (10.5%) parasites. Infection with *Ascarops* spp. (28.2%) and *Fasciolopsis buski* (17.6%) was found to be significantly ($P<0.05$) higher. The tissue sections of the intestines with pathological lesions revealed embedded parasites in intestinal mucosa infiltrated with eosinophils and mononuclear cells. The higher prevalence of GI parasites in slaughtered pigs in Proddatur region rises concern towards the impact on the health of pigs and as well as pork consumers suggesting a strategic control for GI parasites in pig farming.

Key words: Gastro intestinal parasites, Helminths, Histopathology, Prevalence, Protozoa.

INTRODUCTION

Pigs were domesticated since ages, for their ability to convert inedible feeds, forages and garbage into valuable nutritious meat. In India, pig farming sector is highly un-organized with 90% of the pig population being maintained by low income group families (Laha *et al*., 2014). In Andhra Pradesh, swine husbandry practices are highly confined to certain sections of the community (usually below poverty line) due to religious constrains. As a result, majority of pigs are raised under free ranging system and thrive on low planes of nutrition (Tiwari *et al*., 2009). Scavenging nature of pigs favors the uptake of infectious agents from the environment, making them highly susceptible to diseases (Roepstorff and Nansen, 1994). Moreover, the warm and humid climatic conditions of the tropics and the infrequent or no treatment of local pigs against parasitic diseases (Mashatise *et al.,* 2005) greatly enhance the impact of gastro intestinal parasitism in pigs.

Parasitism in pigs is often associated with subclinical infections, decreased growth rate, weight loss in sows and reduction in litter size, poor feed conversion ratio and delayed achievement of market weight (Borthakursk *et al*., 2007). In addition to this, pigs harbouring zoonotic parasites can act as potential threat to human health (Chawhan *et al*., 2014). Prevalence studies on GI parasites affecting pigs have been reported throughout the world by many workers. The common pig parasites recorded globally include *Ascaris* spp., *oesophagostomum* spp., *Trichuris* spp., *Strongyles, Strongyloides* spp., *Eimeria* spp. and *Dicrocoelium* spp. (Olaniyi 2014; Jufare *et al.,* 2015; Kochanowski *et al.,* 2017; Roesel *et al.,* 2017). Information pertaining to GI parasitism in free range pigs is scanty from Andhra Pradesh except with the record of Venkateswara Rao who reported parasite prevalence in desi pigs back in 1996. Lack of record keeping and unorganized swine rearing practices might be the reasons for non availability of data related to parasite prevalence in low income localities of the state. Hence the present study aims at determining the prevalence of GI parasites in the indigenous free range pigs from low income communities of Proddatur municipality in Andhra Pradesh.

Department of Veterinary Parasitology, Sri Venkateswara Veterinary University, College of Veterinary Science, Proddatur-516 360, Andhra Pradesh, India.

Corresponding Author: V. Gnani Charitha, Department of Veterinary Parasitology, Sri Venkateswara Veterinary University, College of Veterinary Science, Proddatur-516 360, Andhra Pradesh, India. Email: dr.charithagnani@gmail.com

How to cite this article: Charitha, V.G., Venkatesh, K., Reddy, C.V.S., Ramya, V. and Sharma, S.V.R. (2022). Prevalence and Pathology of Gastrointestinal Parasites in Free Range Pigs. Indian Journal of Animal Research. 56(1): 90-94. DOI: 10.18805/IJAR.B-4501.

Submitted: 28-04-2021 **Accepted:** 17-08-2021 **Online:** 25-09-2021

MATERIALS AND METHODS

The study was conducted over a period of six months from November 2019 to April 2020. A total of 142 fecal samples were collected from pigs that were slaughtered in Dorasanipalle, Sanjeevnagar, Gopavaram and Bollavaram, Localities of Proddatur Municipality, YSR Kadapa District Andhra Pradesh. The pig rearing in these localities was confined to low income communities and maintenance was purely on free range system (Fig 1).

About 3-5 grams of fecal sample were collected and placed in clean plastic containers and were transported to laboratory after proper labeling. Samples were processed by zinc flotation technique and identification of parasitic eggs and oocysts was carried out as described by Soulsby (1982).

Further, tissue pieces of intestines with embedded parasites and those with pathological changes were collected and fixed in 10% formalin. Tissue sections were subjected to Haematoxylin and Eosin (H & E) staining procedure as described by Culling (1974). The results were analyzed using Chi-square test and the data was statistically represented with $P<0.05$ considered as statistically significant (Snedecor and Cochran 1994).

RESULTS AND DISCUSSION

Out of 142 samples screened, 115 (80.98%) were found positive for parasitic ova or occysts. The high parasitic prevalence recorded in the study was in agreement with Rao *et al.* (1996) who reported an overall prevalence of 90 per cent from desi pigs in Andhra Pradesh. However, the findings of Muraleedharan *et al.* (1994) and Murthy *et al.* (2016) revealed 100 percent prevalence rate in desi pigs of Karnataka state. Among GI parasites recorded in the study, the helminths were more predominant than the protozoan parasites. The findings were in agreement with Deka *et al*. (2005) who reported higher prevalence of nematodes as compared to protozoan parasites in free range pigs of Mizoram State. The higher incidence of helminths as compared to protozoan cysts/oocysts in the study could be attributed to hot and dry climatic conditions prevailing in Proddatur region (Indian Meteorological Department) due to little rainfall availability, thereby increasing the chance of desiccating the cysts/oocysts.

Infection with *Ascarops* spp. (28.2%) and *Fasciolopsis buski* (17.6%) was found to be statistically significant ($P<0.05$) as compared with other species recorded in the study *viz*., *Physocephalus* spp. (6.3%), *Ascaris suum* (6.3%), *Trichuris* spp. (4.9%), stronglyes (8.4%), *Strongyloides* (3.5%), *Oesophagostomum* spp. (1.4%), *Eimeria* spp. (4.2%) and *Balantidium coli* (6.3%) (Fig 2 A to D; Table 1). Most of the previous studies conducted in India have reported *Ascaris suum* as a most common parasite with a prevalence rate of 27.5%, 30.9%, 32.59% and 37.14% from Punjab (Kaur *et al.,* 2017), Jammu and Kashmir (Khajuria *et al.,* 2010), Mumbai (Dadas *et al.,* 2016) and Madhya Pradesh (Singh *et al.,* 2017) respectively. Highest prevalence of *Ascaris suum* (65.46%) was reported from northeastern states of the country by Laha *et al.* (2014). As compared to other studies, the prevalence of *Ascaris suum* (6.33%) was comparatively low in the current study and this was in agreement with Murthy *et al.* (2016) who have reported a prevalence of 7.3 per cent in desi pigs of Karnataka region. This variation in prevalence rate corresponds to variation in climatic conditions; number of samples included in the study and the managemental practices adopted locally.

Ascarops spp. (40/142) was found to be the most prevalent parasitic species recorded in the study. Nine out of 142 samples were positive for *Physocephalus* spp. and it was recorded as mixed infection along with *Ascarops* spp. These findings were in agreement with Rao (1996) who recorded the occurrence of *Ascarops strongylina* in more than 88% of pigs in Andhra Pradesh along with *Physocephalus* spp. The high prevalence of stomach worms (*Ascarops* and *Physocephalus* spp.) in the study might be correlated to their intermediate hosts, dung beetles (Aphodius, Onthphagus and Gymnopleurus) that are readily available and accessible to the swine reared on free range system (Horak, 1978).

Fig 1: Pigs freely roaming in the localities of Proddatur municipality.

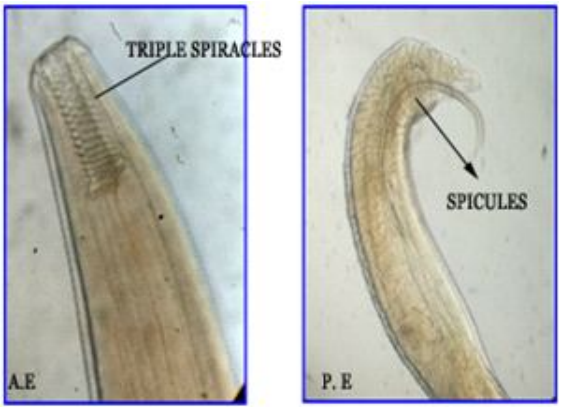

Fig 2A: *Ascarops* spp. Anterior (A.E) and Posterior ends (P.E).

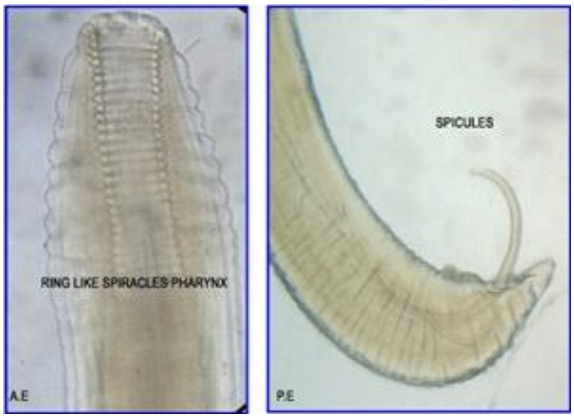

Fig 2C: *Physocephalus* spp. Anterior and Posterior ends.

Fig 2B: *Oesophagostomum* spp. A.E

Fig 2D: *Fasciolopsis buski.*

Table 1: Species wise prevalence of GI parasites in slaughtered pigs at Proddatur.

Parasites species	Parasitic form	Location from which parasitic form was recovered	Total pigs examined (n=142) Found positive (p)	Per (%)
Helminths				
a. Nematodes				
Ascarops spp. (Stomach worms)	Adult worms/eggs in feces	Stomach	40[s]	28.2%
Physocephalus spp. (Stomach worms)**	Adult worms/eggs in feces	Stomach	9*	6.33%
Oesophagostomum spp.	Adult worm	Large intestine	2	1.40%
Ascaris suum	Adult worm and/eggs in feces	Small intestine/caecum	9	6.33%
Strongyloides spp.	Eggs in feces	Large intestine	5	3.52%
Strongyles	Eggs in feces	Large intestine	12	8.45%
Trichuris spp.	Eggs in feces	Large intestine	7	4.92%
b. Trematodes				
Fascilopsis buski	Worms/eggs in feces	Small intestine	25[s]	17.6%
c. Cestodes				
Adult tape worms recorded from intestine**	Worms/segments	Small intestine	4**	7%
II. Protozoa				
Eimeria spp.	Oocysts	Caecum/intestine	6	4.22%
Balantidium coli	Cysts	Intestine/caecum	9	6.33%

*Mixed infection: *Physocephalus spp.* was not found alone and was recorded as mixed infection along with *Ascarops spp.* **Chances of accidental ingestion suspected as adult tapeworm segments were recovered from intestines during necropsy. [s]Was found to be statistically significant when compared to other species with P<0.05.

Fig 3: Congestion of Mesentric blood vessels.

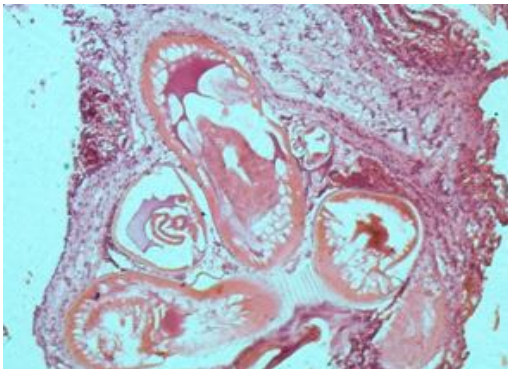

Fig 4a: Cross-section of parasite in gastric mucosa.

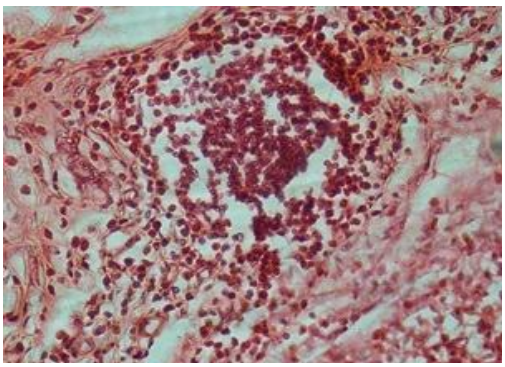

Fig 4b: Eosinophilic infiltration.

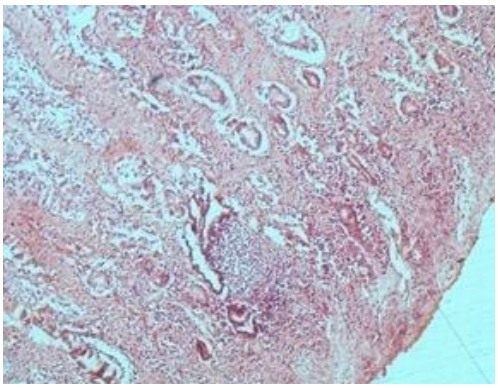

Fig 4c: Degeneration and atrophy of mucosal glands.

Fasciolopsis buski was found to be second most prevalent species recorded in the study with a prevalence of 17.6 per cent. Similar findings were recorded by Khajuria *et al.* (2010) and Singh *et al.* (2017) who recorded a prevalence of 14.83% and 15.16% from Jammu and Kashmir and Madhya Pradesh states, respectively. *F. buski* is considered as the most predominant zoonotic parasite in Southeast Asia. Epidemiological surveys from India reveal that, 33 per cent of children were found to be infected with the parasite (Dey *et al.,* 2014). Swine are the most important animal reservoirs for *F. buski* and drainage of pig excreta in farms/municipal water sources is an important factor for maintaining high endemicity (Mas-Coma *et al.,* 2005). In the present study, the high incidence of *F. buski* in free range pigs of Andhra Pradesh raises concern about human fasciolopsosis outbreaks.

On postmortem, changes like acute and chronic gastritis along with congestion of mesenteric vessels (Fig 3) were observed. Pigs infected with stomach worms showed reddened and edematous gastric mucosa. Histopathological sections revealed embedded parasites in intestinal mucosa surrounded with mononuclear cells, eosinophils and polymorphonuclear cells. Changes like degenerative atrophy of gastric as well as mucosal glands and fibrous tissue proliferation indicate chronic parasitic gastritis (Fig 4a-c).

CONCLUSION

Based on the study, our results suggest that, scavenging nature of pigs and their free access to potentially contaminated areas makes them highly susceptible for wide range of gastrointestinal parasitic infections. High record of zoonotically potential parasite *Fasciolopsis buski* in the region raises concerns about potential human outbreaks in localities who stay in close proximity with the swine population. The local pig rearing communities need to be educated on proper managemental practices with regular deworming schedule that might reduce the GI parasitism and increase the productivity of pigs.

ACKNOWLEDGEMENT

The authors are thankful to College of Veterinary Science, Proddatur, Sri Venkateswara Veterinary University, Tirupathi for providing necessary facilities.

REFERENCES

Borthakur, S.K., Rahmani, S., Sama, K. (2007). Prevalence of Gastrointestinal helminths in pigs in Aizawl. Journal of Veterinary Parasitology. 2: 171-178.

Chawhan, P., Singh, B., Sharma, R., Gill, J.P.S. (2014). Prevalence and molecular epidemiology of porcine cysticercosis in naturally infected pigs (*Sus scrofa*) in Punjab, India. OIE Scientific and Technical Review Forum. 34(3): 953-960.

Culling, C.F.A. (1974). Handbook of Histopathological and Histochemical Techniques Including Museum Techniques. 3rd Edition, Elsevier publication.

Dadas Sachin, Sagarika Mishra, Vijaya kumar, J., Snehil, G., Vinay, T.S., Jagdish, G. (2016). Prevalence of gastro-intestinal parasites in pigs (*sus scrofa*) of Mumbai region, International Journal of Science, Environment and Technology. 5(2): 822- 826.

Deka, D.K., Borthakur, S.K., Patra, G. (2005). Parasitosis in domestic animals and bird of Aizawl, Mizoram. Journal of Veterinary Parasitology. 19: 51-53.

Dey, T.R., Dey, A.R., Begum, N., Akther, S. and Barmon, B.C. (2014). Prevalence of endoparasites of pig at Mymensingh, Bangladesh. IOSR Journal of Agriculture and Veterinary Science. 7(4) Ver. III: 31-38.

Horak, I.G. (1978). Parasites of domestic and wild animals in South Africa. VII. Helminths in pigs slaughtered at the Pretoria Municipal Abattoir. Onderstepoort Journal of Veterinary Research. 45: 43-48.

Jufare, A., Awol, N., Tadesse, F., Tsegaye, Y., Hadush, B. (2015). Parasites of pigs in two farms with poor husbandry practices in Bishoftu, Ethiopia. Onderstepoort Journal of Veterinary Research. 82(1): 1-5.

Kaur, M., Singh, B.B., Sharma, R., Gill, J.P.S. (2017). Prevalence of gastro intestinal parasites in pigs in Punjab, India. Journal of Parasitic Diseases. 41(2): 483-486.

Khajuria, J.K., Rajesh K., Anish Yadav, Sukhdeep V., Soodan, J.S., Borkataki, S., Ajitpal S. (2010). Prevalence of gastrointestinal parasites affecting pigs in Jammu district of Jammu and Kashmir. Veterinary Practitioner. 11(2): 167-168.

Kochanowski, M., Jacek, K., Joanna, D., Arkadiusz, D., Ewelina, C., Tomasz, C. (2017). Occurrence of intestinal parasites in pigs in Poland - The influence of factors related to the production system. Journal of Veterinary Research. 61: 459-466.

Krishna Murthy, C.M., Ananda K.J., Adeppa, J. (2016). Studies on gastrointestinal parasites of pigs in Shimoga Region of Karnataka. Journal of Parasitic Diseases. 40(3): 885-889.

Laha, R., Das, M., Goswami, A., Sailo, B., Sharma, B.K., Gangmei, D., Ngullie, E. (2014). Prevalence of gastrointestinal parasitic infections in pigs of North Eastern Region of India. Indian Journal of Hill Farming. 27(1): 110-117.

Mas-Coma, S., Bargues, M.D., Valero, M.A. (2005). Fascioliasis and other plant borne trematode zoonoses. International Journal of Parasitology. 35: 1255-1278.

Mashatise, E., Hamudikuwanda, H., Dzama, K., Chimonyo, M., Kanengoni, A. (2005). Effects of corn cob-based diets on the levels of nutritionally related blood metabolites and onset of puberty in Mukota and Landracex Mukota Gilts. Asian Australasian Journal of Animal Science. 18(10): 1469-1474.

Muraleedharan, K., Syed Ziauddin, K., Margoob Hussain, P., Puttabyatappa, B., Seshadri, S.J. (1994). Prevalence of parasitic infections among small domestic animals. Karnataka Journal of Agriculture Science. 7(1): 64-68.

Olaniyi, A.J. (2014). Public health implications of gastrointestinal parasites of pigs in Kwara State, Nigeria. Journal of Animal and Veterinary Advances. 13(12): 783-785.

Rao, V. (1996). Parasites of domestic pigs in Andhra Pradesh. Master's thesis submitted to Andhra Pradesh Agriculture University.

Roepstorff, A. and Nansen, P. (1994). Epidemiology and control of helminth infections in pigs under intensive and non-intensive production systems. Vet. Parasitol. 54(1-3): 69-85. doi: 10.1016/0304-4017(94)90084-1. PMID: 7846873.

Roesel, K., Ian Dahoo, Maximillian Baumann, Michel Dione. (2017). Prevalence and risk factors for GI parasites in small scale pig enterprises in Central and East Uganda. Parasitology Research. 116: 335-345.

Singh, A.K., Das, G., Nath, S., Kumar, S., Naresh, R., Agrawal, V. (2017). Prevalence of gastrointestinal parasitic infections in pig in and around Jabalpur, Madhya Pradesh, India. Indian Veterinary Journal. 94(03): 17-19.

Snedecor and Cochran. (1994). Statistical Methods. 8th Edition Wiley-Blackwell Publications, New York.

Soulsby, E.J.L. (1982). Helminths, Arthropods and Protozoa of Domesticated Animals, 7th Edn. Elsivier Publication.

Tiwari, K.P., Chikweto, A., Belot, G., Vanpee, G., Deallie, C., Stratton, G., Sharma, R.N. (2009). Prevalence of intestinal parasites in pigs in Grenada, West Indies. West Indian Veterinary Journal. 9(1): 22-27.