

Spectrum of Tissue Parasitic Infestations in a Tertiary Care Centre in Western Uttar Pradesh

SHWETA AGARWAL, RANJAN AGRAWAL, ANJANA ARYA, MITHILA BISHT, PARBODH KUMAR, DEEPIKA VERMA

ABSTRACT

Introduction: Parasitic infestations are very common in developing countries and are responsible for significant morbidity. Many serological and radiological techniques are available for their detection. However due to the some limitations the microscopic examination of the tissue sections and the aspirated smears stained with appropriate stain remains the gold standard for the diagnosis.

Aim: The present study was carried out to assess the spectrum of tissue parasitic infestations in a tertiary care centre of Western Uttar Pradesh, Rohilkhand region.

Material and Methods: A total of 60 diagnosed cases of parasites with age ranging from 1 year to 70 years in a two year period from January 2016 to jan 2018 were included in the study.

Results: A total of 60 diagnosed cases of parasites were included, of which 3 (5%) cases were detected on bone marrow aspiration, 15 (25%) cases were detected on fine needle aspiration cytology and 42 (70%) cases on histo-pathology sections.

Conclusions: Parasitic infestation is a serious problem in our society. The present study was undertaken to emphasize the importance of screening all the histopathology and cytopathology slides for the detection of parasites in any asymptomatic case. As their incidental detection can reduce the morbidity associated with them significantly.

Extensive literature search did not show any such study being conducted making this study a unique one.

Keywords: Parasites, Bone marrow aspiration, Histopathology, Cytology

INTRODUCTION

Parasitic infestations are very common in every age group and are responsible for significant morbidity in the society [1,2]. Many parasitic infestations like lymphatic filariasis, malaria, ascariasis, cysticercosis, echinococcosis etc fall under the neglected tropical diseases (NTDs) probably due to lack of attention by the public health community [3]. It affects around one billion people i.e. 1/6th of world's population –largely in rural areas of low socio-economic countries. These results in loss of ability to attend school or work, retardation of growth, impairment of cognitive skills and development in young children [3]. Cysticercosis, a leading cause for muscle parasitic infestation, is a larval stage of *Taenia solium*. It can affect any age group and commonly involves organs such as brain and eye or can also present as a subcutaneous nodule in tissue or muscle [4,5]. Filariasis, another major health problem caused by *Wuchereria bancrofti* and *Brugia malayi* [6]. The disease mainly involves the lymphatic system of the body. It can be seen in various locations such as lymph nodes, sub cutaneous tissue, muscle, breast and bone marrow [6,7]. *Ascaris lumbricoides* belongs to the Helminthes group. These are the round worms common in regions of poor sanitation and mainly affect the children in the age group 5-15 years [8]. This infestation cause significant morbidity but rarely

causes death [8,9]. *Enterobius vermicularis*, a nematode also known as thread worm. It commonly affects children. It spreads through contamination, so common in people living in close contact [10] The larva of echinococcus granulosus causes parasitic disease named as Echinococcosis (Hydatid cyst / hydatidosis). It is generally a disease of animals but can spread to humans from close contact with infected animals (dogs, cows, pigs and fox). The finding on cytology is generally incidental [11,12]. This study was done to assess the spectrum of various tissue parasitic infestations in tertiary care center of Rohilkhand region.

MATERIAL AND METHODS

This retro-prospective study was done in the department of Pathology, Rohilkhand Medical College and Hospital, Bareilly. The study was approved by the institutional ethical committee. A total of 60 cases were included in the study with age ranging from 1-70 years. The duration of our study is two years i.e. from January 2016 to January 2018. Since, this is a referral hospital so all the cases that were found positive for the presence of parasite were included in the study.

Cases which came positive for parasitic infestations in bone marrow cytology, Fine needle aspiration cytology and histopathology sections were included in the study.

We excluded the haemoparasites which we found in blood or peripheral smears as we have included only tissue parasites.

In the cytology section, the cases from all age groups who presented as cystic/inflammatory lesions or solid nodules were aspirated. The location of lesions was mainly arm, thyroid, breast and neck nodes region. The smears were then air dried for May-Grunwald- Giemsa Stain and Leishman-Giemsa (L & G) stains and alcohol fixed for Papanicolaou and Hematoxylin & Eosin stains. Bone marrow aspiration slides were also examined after staining with May-Grunwald-Giemsa Stain and Leishman- Giemsa (L & G) stains. Tissues received in histopathology sections were grossed according to standard protocols. Then were processed and paraffin embedded tissue blocks prepared. The sections were then cut and stained using Haematoxylin & Eosin stain.

RESULTS

In the present study, it was observed that a total of 60 parasites were isolated. Out of these, 3 (5%) were in bone marrow aspirate samples, 15 (25%) in cytology cases and 42(70 %) in histopathology sections.

[Table/Fig-1-3] shows the parasite distribution on FNAC, Histopathology and Bone marrow aspiration cytology.

In the FNAC, smears microfilaria was the commonest parasite identified. Three cases of microfilaria presented as subcutaneous arm swellings admixed with inflammatory infiltrate and eosinophils. Two cases were identified in thyroid swellings which presented as colloid goiter. Three cases of microfilaria were noticed in breast along with benign breast disease and granulomas. Whereas three cases were identified in cervical swellings associated with haemorrhagic cysts.

S. no.	Site	Microfilaria	Cysticercus	Echinococcus granulosus
1	Arm swelling	3	1	
2	Thyroid swelling	2		
3	Cervical swelling	3		1
4	Breast lump	3	2	
Total		11	3	1

[Table/Fig-1]: Distribution of parasites diagnosed by FNAC.

Microfilaria is very common in western UP. Eight cases of microfilaria in the histopathology were noted. The sites were axillary lymph node, breast, epididymis and scrotum. In H and E sections, it was accompanied with eosinophilic infiltration, giant cells, fibrosis and necrosis and granuloma formation. In the bone marrow examination, we found microfilaria in three cases. Two cases were associated with hypoplastic marrow and the third with erythroid hyperplasia.

[Table/Fig-4a] shows microfilaria on histopathology section of epididymis. Another slide shows microfilaria with granuloma formation mimicking tuberculosis in epididymis of 32 year male [Table/Fig-4b]. [Table/Fig-4c,d] shows it along with benign breast disease and erythroid hyperplasia on FNA and bone marrow aspiration respectively.

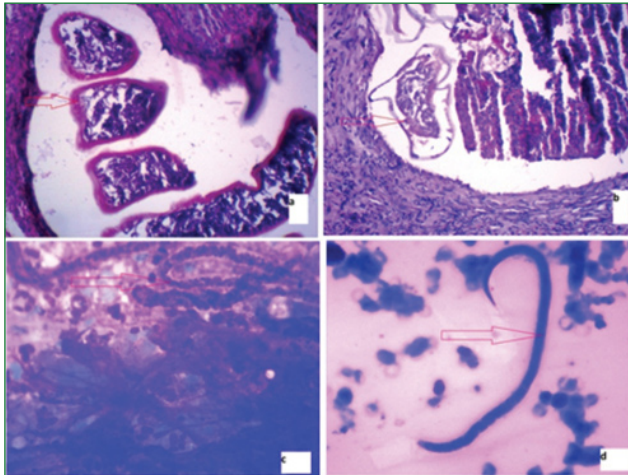
Cysticercus was found in three cases on FNAC. Two were identified in the breast swelling and the third was in arm swelling. All cases presented as a cyst and the aspirate was clear fluid like. The smear showed fragments of larval bladder wall along with calcareal hooklets in a background of polymorphs, few lymphocytes, plasma cells, giant cells,

S. no.	Site	Microfilaria	Cysticercus	Hydatid cyst	Enterobius vermicularis	Diocotphyoma renale	Ascariasis
1	Eye		7				
2	Tongue		3				
3	Cheek		1				
4	Scalp		1				
5	Neck		1	1			
6	Chest wall		2				
7	Breast	2	1				
8	Axillary lymph node	2					
9	Arm		3				
10	Abdominal wall		9				
11	Intestine						2
12	Calf		1				
13	Scrotum	4					
14	Ovary				1		
15	Urinary bladder					1	
Total		8	29				

[Table/Fig-2]: Distribution of parasite on Histopathological Examination.

s. no.	Age/sex	Haematological Diagnosis	parasite
1	50/m	Erythroid hyperplasia with micronormoblastic reaction	Microfilaria
2	35/m	Hypoplastic marrow	Microfilaria
3	5/f	Hypoplastic marrow	Microfilaria

[Table/Fig-3]: Distribution of Parasites on Bone Marrow Aspiration Cytology.



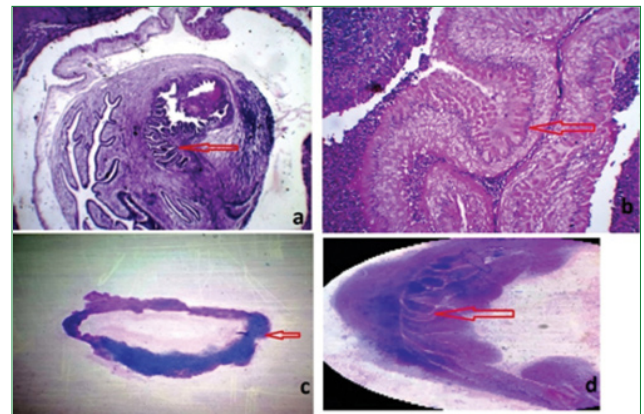
[Table/Fig-4]: Showing microscopic picture of-
 A Microfilaria in epididymal cyst (400X, H&E)
 B Microfilaria in epididymis mimicking tuberculosis (400X, H&E)
 C FNAC smears showing microfilaria in right breast (400X, L&G)
 D Bone marrow smears showing microfilaria with marrow cells (400X, L&G)

cystic macrophages and eosinophils. On the histopathological examination of biopsies, 29 cases of *Cysticercus* were identified. The mean age group was 25 ± 15 years. This parasite was identified in various tissues like tongue, eye, chest wall, abdominal wall, cheek, scalp/brain, calf muscle, arm, and neck. Few slides showed serrated cysticercus larva, few showed the presence of sucker with cuticle cells and defined cellular layers. The slide from brain (neurocysticercosis) showed an arborising growth pattern with grape like mass several centimeters in diameter. The inflammatory infiltrate comprising of neutrophils, lymphocytes, eosinophils, plasma cell, giant cells, epithelioid cells (in varying proportions in different cases) were common in all the slides. Few slides also showed necrosis in the background.

[Table/Fig-5a-d] shows microscopic view of cysticercus cellulosae on H and E and FNA slides

A case of ascariasis in the small intestine was identified causing obstruction and then gangrene of the organ. The slide showed the worm in the background of inflammatory cell. Another case of ascariasis was found in large intestine along with mucinous adenocarcinoma signet ring cell type. The finding of a parasite along with malignancy is generally an incidental finding.

In one case, *Enterobius vermicularis* was identified in a 45 year old female patient ovary with appendiceal perforation. The section showed parasite compatible with *Enterobius*

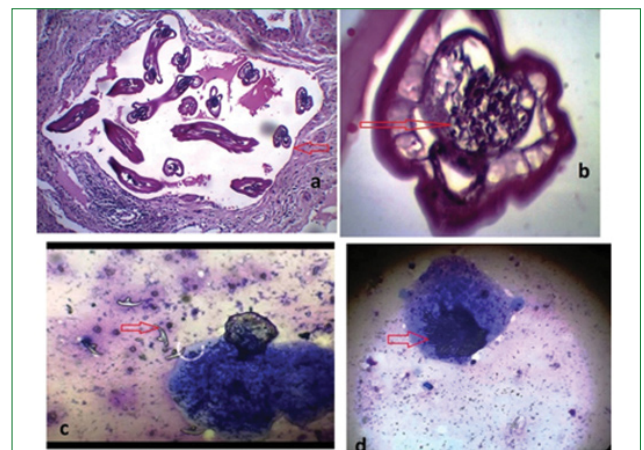


[Table/Fig-5]: showing microscopic view of-
 A *Cysticercus cellulosae* in left eye swelling (400X, H&E)
 B *Cysticercus cellulosae* in abdominal wall swelling (100X, H&E)
 C FNAC showing cysticercus cellulosae in right breast lump (400X, L&G)
 D FNAC smears showing cysticercus cellulosae in arm swelling (oil emersion, L&G)

vermicularis admixed with inflammatory infiltrate in the ovarian stroma.

FNAC of a 25 year old male patient with left side neck swelling yielding thin fluid like material, was aspirated. The smears showed the refractile structures (hooklets and scolex) compatible with *Echinococcus* along with dispersed polymorphs, histiocytes and eosinophils. These structures were then confirmed as *Echinococcus granulosus* parasite on histopathology.

[Table/Fig-6a,b] *Enterobius vermicularis* on H and E section of ovary and [Table/Fig-6c,d] shows *Echinococcus granulosus* along with inflammatory cells in the neck swelling.



[Table/Fig-6]: showing microscopic view of
 A *Enterobius vermicularis* in ovary (400X, H&E)
 B *Enterobius vermicularis* in ovary (oil emersion, H&E)
 C *Echinococcus granulosus* in left side neck swelling (400X, L&G)
 D *Echinococcus* in left side neck swelling (400X, L&G)

DISCUSSION

Parasites are very common in developing countries being responsible for significant morbidity, if remain undiagnosed.

Their detection by microscopic examination of the tissue is cost effective, reliable and most definitive [7]. These parasites can be identified in any pathological sample including peripheral smear, histology or cytology. Therefore all the samples in histopathology and cytopathology should be screened for the presence of parasite as they are mostly diagnosed incidentally along with malignancy or any infection. In histopathology, mostly parasites may show marked eosinophilic infiltration or granulomatous inflammation or focal infiltration of macrophages, epithelioid cells, giant cells, fibroblast, lymphoid cells, and plasma cells. And thus the deeper section may show the complete parasite. For superficial swellings, FNAC helps in the early diagnosis of parasites. As it gives the diagnosis very early and the waiting period of histopathological examination is passed off.

The main disease causing parasites in humans are Protozoa, Helminthes and Ectoparasites [9]. Protozoas are unicellular organisms consists of entamoeba, giardia, leishmania, plasmodium etc. Helminthes are multi cellular organisms, such as trematodes, cestodes (tapeworm), *Echinococcus granulosus*, ascariasis etc. Ectoparasites include mosquitoes, fleas, ticks, lice etc [9].

Wuchereria bancrofti causes lymphatic filariasis [7]. It is known to be the second leading cause of permanent and long term disability after leprosy by WHO [7]. The filariasis has three phases: asymptomatic phase, inflammatory phase and chronic lymphoedema [7]. In this study, three cases of microfilaria in the bone marrow examination which was compatible with the study of Pradhan S et al., [13] were identified. We noticed two cases of microfilaria on FNAC of thyroid swellings associated with colloid goiter. Similar results were noticed by Gupta et al., and Mishra et al., in their study [6,14]. We noticed three cases of microfilaria in FNAC from sub cutaneous swellings, four cases in breast swellings, 3 in cervical lymph node swellings. The same findings were reported by Varghese et al, Yenkeswar et al, Upadhyay et al., and Jindal et al., [2,15,16]. In histopathological examination, we found one case of microfilaria associated with breast ductal malignancy, which was similar to the Kolte et al., study [17].

The larval stage of *Taenia solium* is the causative agent of the parasitic disease Cysticercosis in humans. Various tests are available for its diagnosis such as CTscan, MRI, Ultrasonography and serological tests like Elisa. The radio imaged tests are costly enough and less available while serological tests have less sensitivity. That's why FNAC is considered as most preferable method for diagnosis of cysticercosis. Also FNAC can be merged with USG as US guided FNAC to increase sensitivity and the histopathological examination confirms the diagnosis [1,4]. On FNAC demonstration of fragments of larval bladder wall, hooklets and calcareal corpuscles confirms the diagnosis of cysticercosis. In our study we identified 32 cases of cysticercus cellulosae [5]. The mean age of diagnosis was 25±15 years with only two cases at 60 and above ages.

This is similar to the study done by Adhikari et al, Handa et al., and Kodiatte et al., [1, 4,18]. Here in our study we found the trunk as the most common location where cysticercus was found. And it is similar to the study by Rajwanshi et al. However Kodiatte found the head and neck as the most common location. Ghimere et al., and Handa et al., found upper limb as the most common location [1,5].

The most common parasite found in humans is *ascaris lumbricoides*. Since they reside in the small intestine therefore pass their eggs in faeces. Their finding on histopathology is generally a chance finding. Due to its motile nature the larval stage causes ascariasis pneumonia. The adult form can cause obstruction of small intestine, bile duct, and trachea. It can also cause appendicitis, pancreatitis and peritonitis. Rare complications are perforation and gangrene of intestine [19,20]. In our study we noted a single case of *ascaris lumbricoides* with gangrenous small intestine. Gupta et al., in their study also reported a case of prepyloric gastric perforation due to ascariasis [19]. Bhutia et al., also reported a single case of ascariasis with infarction of mesenteric lymph node and intestinal gangrene [20].

Another parasite *Enterobius Vermicularis*, (pin worm or thread worm) also transmit through faeco oral route. Its adult form attaches to the mucosa of the intestine by its anterior end. It mainly presents as pruritis ani and Cellophane tape test is done for its diagnosis. Sometimes it can also be seen in extra intestinal site [10, 21]. In our study we found one case of *enterobius vermicularis* in ovary with perforation of appendix. Hamdona et al., and Akbulut et al., found around 15% and 28.4% cases of appendicitis with *Enterobius vermicularis* respectively [10,22].

Echinococcus granulosus can affect any part of the body. But liver is the most frequent site followed by lung [11,12]. Here we found one case of hydatid cyst from neck swelling, which is extremely rare. The smear showed hooklets, scolices and fragments of laminated membranes. Bothak et al., reported one case of hydatid cyst in thigh FNAC [11]. Kim et al., also found only one case of hydatid cyst from liver FNAC [12].

Diocotophyma renale rarely affects humans. It results in destruction of whole of the renal parenchyma causing fibrosis mostly unilateral. Here in our study we found one case of *Diocotophyma renale* in the urinary bladder as incidental finding with eggs detected in urine. Li et al., reported one case of bilateral *diocotophymosis* [22].

LIMITATIONS

Only few parasites could be included in the present study depending upon the endemicity of patient draining area.

Extensive literature search did not show any such study being conducted making this study a unique one.

CONCLUSION

Parasitic infestation is a very serious problem in a society. This article shows the importance of screening all the

histopathology, cytopathology and bone marrow aspiration slides for the detection of parasites in any asymptomatic case. As their incidental detection can reduce the associated morbidity significantly.

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