



## PARASITES IN PATHOLOGY: AN INSTITUTIONAL EXPERIENCE

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**ABSTRACT**

**Background:** Parasitic infestation has a worldwide prevalence and it affects almost all age groups and both sexes. In today's era the incidence of these infections is rising. Parasites are usually found in stool samples but in recent times due to the increase in immunocompromised states, parasitemia in other tissues has increased globally necessitating broad based studies for detection. Microscopic examination and ancillary studies play an important role in the diagnosis, assessing the severity and complications. **Methodology:** An observational study related to parasites diagnosed in the Department of Pathology, NRI Institute of Medical Sciences-Anil Neerukonda Hospital, Visakhapatnam from January 2021 to December 2021. A wide variety of samples were studied which included blood samples, bone marrow aspirations, fine needle aspiration cytology, pap smears, bronchoalveolar lavages, tissue biopsies, urine samples and squash smears. Detailed study of these cases is conducted by using routine stains and ancillary techniques such as special stains and fluorescent microscopy. **Results:** Most common parasite seen was *Trichomonas vaginalis* in pap smears followed by *Plasmodium* species in blood. Some rare parasites and common parasites at uncommon locations were also identified. **Conclusion:** Parasitology is a less explored arena. An accurate microscopic diagnosis benefits the patient by avoiding overtreatment and inappropriate treatment, so an emphasis on this part is necessary.

**KEYWORDS :** Parasites, Cytology, Histopathology, Neurocysticercosis, incidence.

**INTRODUCTION:**

Parasite is an organism that lives on or in a host organism and gets its food at the expense of its host.<sup>1</sup> Millions of people around the world are affected by parasitic infections and it is a major public health problem not only in underdeveloped and developing countries but even in developed world.

This emphasizes the necessity of prompt diagnostic modalities, which will help to not only reduce the complications but also refrain from overtreatment. Clinical diagnosis of parasitic infestations is challenging because of non specific signs & symptoms (such as abdominal pain, dysentery, rash, malaise etc..)<sup>2</sup>

Microscopy aids in the accurate diagnosis of infections and therefore the treatment. The most common diagnostic procedure is analysis of blood and fecal samples but other modalities such as wet mounts, concentration technique, immunofluorescence, cytological & histopathological examination are also helpful.<sup>3</sup>

Most common parasites belong to the classes Protozoa and Helminths. The class Protozoa includes four groups- Amoebae, Flagellates, Ciliates and Sporozoa. Helminths include three main groups- Trematodes, Cestodes and Nematodes.<sup>4</sup>

**AIMS & OBJECTIVES:**

The aim of this study is to study the incidence of parasites in the tissue samples received in Department of Pathology in a span of one year and also to study the tissue responses and morphological changes to various types of parasites.

**MATERIALS AND METHODS:**

This was an Observational study done in the Department of Pathology, NRI Institute of Medical Sciences - Anil Neerukonda Hospital, Visakhapatnam during the period of one year, January 2021- December 2021.

Out of all cytology, haematology, clinical pathology and histopathology samples, in 99 cases parasites were diagnosed.

Hematology samples were examined by preparation of thin and thick smears stained with Leishman stain and Quantitative Buffy Coat examination by fluorescent microscopy.

Urine samples were examined by wet mount preparation and sediment smears prepared after centrifugation. These were stained by standard Leishman and Giemsa stains.

Cytology samples include bronchoalveolar lavage, FNAC, cervical pap smears, squash smears, bone marrow aspiration

and biopsies. Bronchoalveolar lavage samples were centrifuged and sediment smears prepared were stained with hematoxylin and eosin.

FNAC smears were prepared by both alcohol fixation and air drying. These were stained with routine Hematoxylin and Eosin, Papanicaloau stain and Giemsa stain respectively.

Squash smears were studied after alcohol fixation and staining with rapid H&E.

Cervical pap smears were alcohol fixed and stained by standard Papanicalou method.

Bone marrow aspiration smears were air dried and stained with Giemsa while biopsy was formalin fixed and slides were stained with H&E.

**Inclusion criteria:**

All parasitic infections diagnosed on following samples are included in this study.

1. Blood samples
2. Bone marrow aspirates
3. Cervical PAP smears
4. FNAC samples
5. Squash smears
6. Bronchoalveolar lavage
7. Urine samples
8. Tissue biopsies.

**Exclusion criteria:**

All of the following samples are excluded.

1. Parasites diagnosed in stool samples.
2. Malarial parasites detected by Card Test.
3. Parasites detected by serology.

**RESULTS:**

In the one year observational study conducted, we diagnosed a total of 99 cases of parasitic infestations.

The distribution of various parasites has been depicted in Table-1. Protozoa constituted 77 cases out of the 99 diagnosed cases forming a percentage of 77.8%. This was followed by helminthic infestation comprising of 22.2% of the cases.

Among the Protozoa, *Trichomonas vaginalis* (Fig-1 ) showed the highest incidence (37.4%) , with 37 cases out of 77 protozoa, which were detected in cervical smears stained with PAP stain. The second commonest protozoa in this study was malarial parasite(Fig- 2A & 2B) with an incidence of (35.4%), 35cases out of the 77 protozoa. These were predominantly diagnosed on peripheral smear examination and stained by Leishman stain, which is also the gold standard for diagnosis. We also encountered few other protozoas, 2 cases of *Entamoeba histolytica* in colon specimen, 2 cases of *Leishmania donovani* (Fig- 3) in bone marrow aspirate and a case of *Toxoplasma gondii* in broncho alveolar lavage.

Among the Helminths, a high incidence of Filarial parasite (Fig-5) was seen. A total of 6 cases were diagnosed. Interestingly cases were also seen in rare sites with one in the breast of a 42 year old lady presenting with a breast lump and one in thyroid of a 60 year old female.

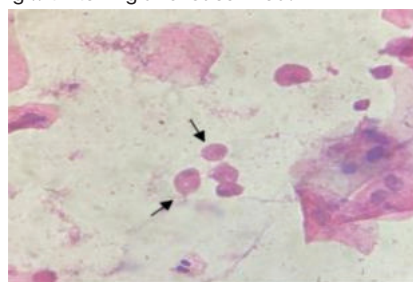
This was followed by 3 cases of *Cysticercosis*(Fig-4A & 4B). Among these 2 cases were diagnosed in chest wall and one case of *Neurocysticercosis* was also detected.

Also among the helminths 2 cases of hydatid cysts in liver biopsies and 4 cases of *Enterobius vermicularis*(Fig-6), identified.

**Table-1**

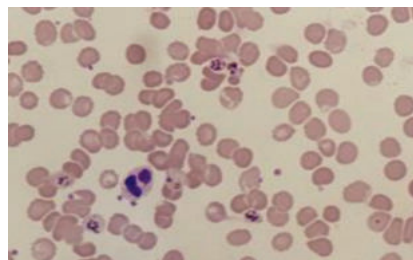
PARASITE	Hematology	Cytology	Histopathology	Percentage
<b>PROTOZOA (77.8%)</b>				
Malaria	35			35.4%
<i>Entamoeba histolytica</i>			02	2.1%
<i>Trichomonas vaginalis</i>	-	Pap smears-34. Urine- 03		37.4%
Kala- azar	Bone marrow-02			2.1%
Toxoplasmosis		BAL-01		1.1%
<b>HELMINTHS (22.2%)</b>				
Filaria	04	02 (Breast & Thyroid)		6.1%
<i>Cysticercosis</i>			Chest wall & Arm-02, CNS -01	3.1%
Hydatid cysts			02	2.1%
<i>Enterobius vermicularis</i>		Pap smear - 01	03	4.2%

*Trichomonas vaginalis* in pap smear of a 32 year old woman presenting with itching and leucorrhoea.

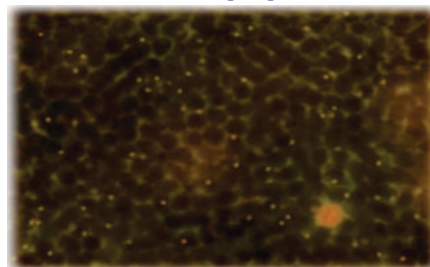


**Fig-1: Trichomonas vaginalis in pap smear.**

A case of 24 years male with a history of road traffic accident underwent a splenectomy 10 days ago, presented with fever of 5 days duration. On peripheral smear examination *Plasmodium vivax* was seen and also detected on quantitative buffy coat examination.



**Fig2(A): Schizonts of P.vivax in peripheral smear (40X)**



**Fig2(B): Schizonts of P.vivax in QBC (50x)**

Fig 2(A) and 2(B) show the images of the peripheral smear and qbc respectively.

40 year old male patient presented with high grade fever and splenomegaly. On Peripheral smear examination, pancytopenia is seen. Bone marrow was done.

Figure 3 shows intracellular Leishmania donovani bodies.

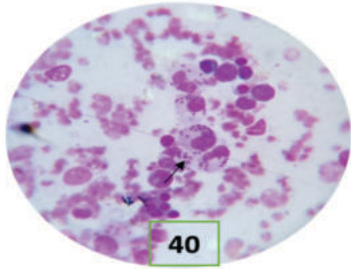


Fig-3: Intracellular Leishmanian parasite in bonemarrow aspiration(40x)

34years, male patient presented with generalised seizures since 15 days, not associated with fever. Squash cytology and later biopsy was done.

Figure-4(A) shows acellular granular debris in cytology and Figure4(B) shows neurocysticercosis on histopathological examination.

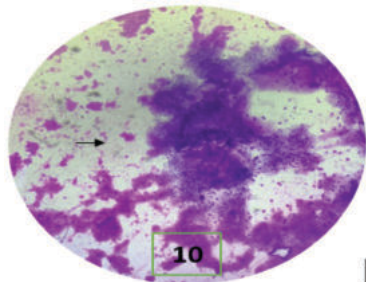


Fig-4(A): In Squash Cytology- Acellular Granular Debris seen(10x)

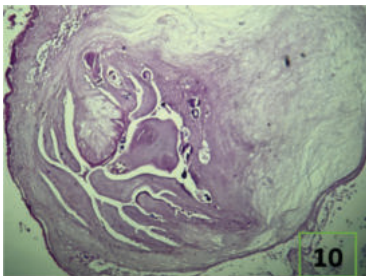


Fig-4(B): Neurocysticercosis on tissue biopsy(10x)

Figure-5 shows filarial parasite which is an incidental finding in a 60 year old lady.

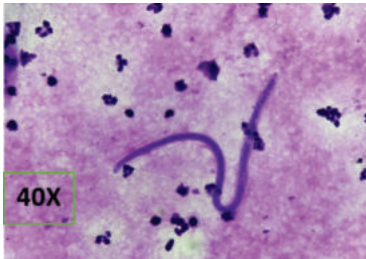


Fig-5:Filariasis in a thyroid swelling presented as goiter. (40x)

**DISCUSSION:**

Parasitic infections are considered as a public health problem in underdeveloped and developed conditions due to the environmental and socioeconomic status.<sup>5</sup> The cornerstone for the diagnosis of parasitic infections is a thorough history and clinical details.<sup>2</sup>

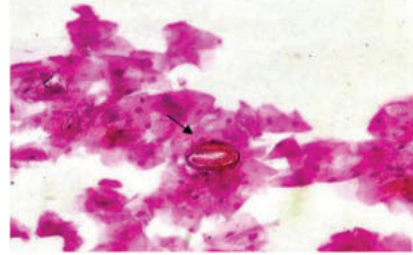


Fig-6: Enterobius vermicularis eggs in pap smear(40x).

Epidemiologic aspects such as travel to areas of high endemicity are especially important in diagnosing parasites.<sup>5</sup> Our hospital is a tertiary care center which serves a large geographical area involving both rural and urban population. So a wide variety of parasites were diagnosed and included in this study.

Among all parasites in this study, Trichomonas vaginalis constituted about 4.5% and is compared to a similar study conducted by Pathak.et.al. at Nepal ,which showed an incidence of 8.9%<sup>7</sup>,Trichomonas infections are of less prevalence in our area.

We also encountered 2 cases of the Trichomonas vaginalis parasite in urine samples of women of reproductive age.

One case of Enterobius vermicularis eggs, an incidental finding was also identified in pap smears constituting about 0.1% and as a similar study done by Tsai Chun-Yi et.al. in year of 2020, it is only an incidental finding in female genital tract and no specific incidence is seen.<sup>8</sup>

In one year span of our study, a total of 35cases ( incidence of 2.6%) of malaria cases were diagnosed which when compared with a similar study by Chetan kumar et al (incidence of 0.45%, is of higher incidence in our area).<sup>9</sup>

33cases of the malaria are diagnosed in peripheral smears only which included Plasmodium vivax and Plasmodium falciparum and also few cases of mixed infections. But 2cases missed on peripheral smear , showed positive for malarial parasite in quantitative buffy coat examination.

Filariasis is an endemic disease in India, and is caused by Wucheraria bancroftii. Mostly , it is seen in lymphatic vessels and lymph nodes of human beings. It is very rare to find filariasis in soft tissues.

In our study, we encountered a case of filariasis in breast, which is an incidental finding in a patient of breast lump. Similar finding has been discussed in the case report done by Sabina tKhan e.al.<sup>10</sup>

Microfilarial larvae is rarely associated with benign and malignant breast lesions<sup>10</sup> and on cytology shows benign ductal epithelial cells, mixed inflammatory cell infiltrate, macrophages and filarial worm.<sup>11</sup>

Another incidental filariasis case is diagnosed in thyroid aspirate ,in a 60 year old woman similar to a study conducted by Abhay Vilas Deshmukh et.al.<sup>12</sup>, done at Maharashtra. In both the studies it has been an incidental finding in a goiter patient.<sup>12</sup>We obtained a blood mixed aspirate and on examination along with benign thyroid follicular cell clusters, inflammatory cells filarial larva is found.

As per studies conducted by Sarah Mann et al<sup>13</sup> in 2021 and Chinmay kar et.al<sup>14</sup> in 2019 , the incidence of kala azar is high in South East Asian countries and again in India it is common in northern India such as west Bengal, Bihar and Jharkand it is rare in Southern India. In this study, we came across 2 cases of

Visceral Leishmaniasis in patients having a recent travel history to West Bengal and Bihar. 3 cases of Cysticercosis, 2 in chest wall and another Neurocysticercosis is also documented in this study.

A clear fluidy aspirate on FNAC is a clue to parasitic infections and when the same is aspirated from subcutaneous and intramuscular nodule , a strong suspicion for Cysticercosis should be considered.<sup>15</sup>

#### CONCLUSION:

Parasites as present with nonspecific complaints, so an accurate microscopic diagnosis benefits the patient by avoiding overtreatment and inappropriate treatment. Many studies have been conducted stating the prevalence of parasites in stool samples in various regions of India. However very few similar studies have been conducted which state presence of different parasites in other samples such as blood , bone marrow aspirates, pap smears, squash smears, bronchoalveolar lavage etc

Hence a detailed clinical history and morphological knowledge of parasites is of paramount importance in diagnosis.

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