

# PARASITIC INFECTION AND ITS ORAL MANIFESTION: A REVIEW ARTICLE

Sayan Mitra<sup>1</sup>, Aruna das H<sup>2</sup>, Santosh kumar<sup>3</sup>, Prabhakar kumar<sup>4</sup>

1.P.G Student Dental College Azamgarh

2.Professor And Head, Dental College Azamgarh

3.Reader, Dental College Azamgarh

4.Reader ,Dental College Azamagrh.

### ABSTRACT

The word parasite comes from the Medieval French “parasitte”, from the Latin “parasitus”, from the Greek (parasitos), "one who eats at the table of another" and that from (para), "beside, by" (sitos), "wheat" A **parasitic disease** is an infectious disease caused or transmitted by a parasite. Many parasites do not cause diseases. Parasitic diseases can affect practically all living organisms, including plants and mammals. The study of parasitic diseases is called parasitology. The three main types of organisms causing these conditions are protozoa (causing protozoan infection), helminths (helminthiasis), and ectoparasites. Occasionally the definition of "parasitic disease" is restricted to diseases due to endoparasites.

**Keywords:** Parasite, oral ,disease.

### INTRODUCTION:

The word parasite comes from the Medieval French “parasitte”, from the Latin “parasitus”, from the Greek (parasitos), "one who eats at the table of another" and that from (para), "beside, by" (sitos), "wheat". First used in English 1539 and coined in English in 1611. Parasitism is a non-mutual relationship between organisms of different species where one organism, the parasite, benefits at the expense of the other, the host. Traditionally parasite referred to organisms with life stages that needed more than one host (e.g. Taenia solium). These are now called macroparasites (typically protozoa and helminths). Parasite now also refers to microparasites, which are typically smaller,

such as viruses and bacteria, and can be directly transmitted between hosts of the same species. Examples of parasites include the plants mistletoe and cuscuta, and organisms such as hookworms.

Unlike predators, parasites are generally much smaller than their host; both are special cases of consumer-resource interactions. Parasites show a high degree of specialization, and reproduce at a faster rate than their hosts. Classic examples of parasitism include interactions between vertebrate hosts and diverse animals such as tapeworms, flukes, the *Plasmodium* species, and fleas.

**Types:** Parasites are classified based on their interactions with their hosts and on

their life cycle. Human head lice are ectoparasites.



Parasites that live on the surface of the host are called **ectoparasites** (e.g. some mites). Those that live inside the host are called **endoparasites** (including all parasitic worms). Endoparasites can exist in one of two forms: **intercellular parasites** (inhabiting spaces in the host's body) or **intracellular parasites** (inhabiting cells in the host's body). Intracellular parasites, such as protozoa, bacteria or viruses, tend to rely on a third organism, which is generally known as the carrier or vector. The vector does the job of transmitting them to the host. An example of this interaction is the transmission of malaria, caused by a protozoan of the genus plasmodium, to humans by the bite of a mosquito. Those parasites living in an intermediate position, being half-ectoparasites and half-endoparasites, are sometimes called **mesoparasite**.



An **epiparasite** is one that feeds on another parasite. This relationship is also sometimes referred to as hyperparasitism exemplified by a protozoan (the hyperparasite) living in the digestive tract of a flea living on a dog. **Social parasites** take advantage of interactions between members of social organisms such as ants or termites..

**Adaptation:** Parasites infect hosts that exist within their same geographical area more effectively. This phenomenon supports the "Red Queen hypothesis—which states that interactions between species (such as host and parasites) lead to constant natural selection for adaptation and counter adaptation." The parasites track the locally common host phenotypes; therefore the parasites are less infective to hosts.

**Roles in ecosystems:** Modifying the behavior of infected hosts, to make transmission to other hosts more likely to occur, is one way parasites can affect the structure of ecosystems. Although parasites

are often omitted in depictions of food webs, they usually occupy the top position.

A **parasitic disease** is an infectious disease caused or transmitted by a parasite. Many parasites do not cause diseases. Parasitic diseases can affect practically all living organisms, including plants and mammals. The study of parasitic diseases is called parasitology. The three main types of organisms causing these conditions are protozoa (causing protozoan infection), helminths (helminthiasis), and ectoparasites. Occasionally the definition of "parasitic disease" is restricted to diseases due to endoparasites.

**Causes**

Mammal can get parasites from contaminated food or water, bug bites or sexual contact. Parasites normally enter the body through the skin or mouth. Close contact with pets can lead to parasite infestation as dogs and cats are host to many parasites.

**Leishmania** – can severely affect the human oral cavity and it does so indirectly by causing granulomatous growth disfigurements involving the mouth and nose.

The following table shows the principal morphological distinctions for each of these helminth families:

	<b>Cestodes (tapeworms)</b>	<b>Trematodes (flukes)</b>	<b>Nematodes (roundworms)</b>
Shape	Segmented plane	Unsegmented plane	Cylindrical
Body cavity	No	No	Present
Body covering	Tegument	Tegument	Cuticle
Digestive tube	No	Ends in cecum	Ends in anus
Sex	Hermaphroditic	Hermaphroditic, except schistosomes which are dioecious	Dioecious
Attachment organs	Sucker or bothridia, and rostellum with hooks	Oral sucker and ventral sucker or acetabulum	Lips, teeth, filariform extremities, and dentary plates
Example diseases in humans	Tapeworm infection	Schistosomiasis, swimmer's itch	Ascariasis, dracunculiasis, elephantiasis, enterobiasis (pinworm), filariasis,

			hookworm, trichinosis, (whipworm)	onchocerciasis, trichuriasis
--	--	--	---	---------------------------------

**Table 3. Oral infections caused by parasites**

Parasite category and infection	Parasite species
<b>Arthropods</b> Myiasis	<i>Wohlfahrtia magnifica</i>
<b>Cestodes</b> Teniasis of cysticercosis	<i>Taenia saginata</i> <i>Taenia solium</i>
Echinococcosis	<i>Echinococcus granulosus</i> <i>Echinococcus multilocularis</i>
<b>Nematodes</b> Trichinosis Gongyloneoma Ascaris	<i>Trichinella spiralis</i> <i>Gongylonema pulchrum</i> <i>Ascaris lumbricoides</i>
<b>Protozoa</b> Leishmaniasis	<i>Leishmania donovani</i> <i>Leishmania infantum</i> <i>Leishmania chagasi</i> <i>Leishmania mexicana</i>

**Local oral parasitic infections**

The two protozoa commonly mentioned in relation to the human oral cavity, namely *T. tenax* and *E. gingivalis*, are usually harmless commensals. The finding of these organisms in the mouth is associated with poor oral hygiene and they may be quite common in people who have a low standard of living.

**A. DISEASES CAUSED BY CESTODES:**

**CESTODES:** The class *Cestoideu* belongs to the phylum *Plutyhelminthes* and includes the parasitic tapeworms. Tapeworms have flat, segmented bodies consisting of a head

and a series of segments known as proglottids.

**1. TENIASIS AND CYSTICERCOSIS:**

The tapeworms *Tuenia sagenata* (beef) and *Tueniu solium* (pork) produce two different types of disease in humans: teniasis and cysticercosis. Teniasis is an infestation of the human small intestine by adult forms of: *sugenta* or: *solium*, following ingestion of cysticercus cellulose or cysticercus bovis cysts present in infested and insufficiently cooked pork or beef.

**Oral manifestations** of teniasis were reported by Mallett as a red, edematous, hyperplastic mucositis, accompanied by

gingival bleeding and pain in a patient diagnosed with *T. saginata*. Although a parasitic cause for stomatitis is uncommon, it should be included in a differential diagnosis. Intestinal teniasis is diagnosed by demonstration of the proglottid stage in feces.

Cysticercosis, in turn, results from the extraintestinal encystation of the larval forms of *T. solium*. In rare circumstances, and generally as a result of poor hygienic conditions, humans may ingest the eggs or proglottids of the parasite

**ECHINOCOCCOSIS (HYDATID DISEASE):** *Echinococcus granulosus*, a parasite of dogs, is one of the smallest tapeworms, measuring only 5 mm in length. Only the larval form of the echinococcosis infection is found in the human host, and it results in a spaceoccupying lesion known as the hydatid cyst. **Oral manifestations:** Hydatid cysts of the oral structures have been reported in six human cases. Three have involved the tongue, and one each in the mandible, buccal mucosa and the infratemporal fossa. Clinically, they were described as well-circumscribed, soft or firm, elastic, fluctuant painless swellings. The cysts involving the tongue caused difficulty with swallowing, speech and mastication as they increased in size. All hydatid cysts were surgically removed and diagnosed microscopically.

## **DISEASES CAUSED BY NEMATODES**

Nematodes are non-segmented roundworms belonging to the phylum *Nematoda*. The members of most species of nematodes live in soil, fresh and salt water. Most parasitic nematodes have developed biological dependence on a particular host. Human infections caused by nematodes are among the most prevalent in humans, infecting more than a billion individuals. Children are particularly susceptible to these parasites and suffer greater morbidity. **Nematode infection of the oral cavity**, however, is very rare. The ten reports of nematode infection in the dental literature have involved the genera *Trichinella*, *Gongylonema* and *Ascaris*.

### **1. TRICHINOSIS**

#### **(TRICHINELLOSIS):**

Trichinosis is caused by *Trichinella spiralis*, a roundworm parasite capable of infecting all mammals. It may be transmitted to humans via poorly cooked meat, usually pork, containing encysted larvae. In the small intestine, the larvae capsules dissolve, adult worms develop; reproduce, and then the new larvae enter vessels, circulate and invade striated muscle **Oral manifestations:** Five cases of oral trichinosis have been reported.

Zegarelli et al. found encapsulated remnants of *T. spiralis* in biopsies of bilateral soft tissue tumors removed from the mucobuccal folds adjacent to the edentulous maxilla of a 40-year-old woman. There was no striated muscle in specimens. Curphey reported on a 48-year-old man who experienced recurrent swellings of the edentulous right posterior alveolar ridge. He described a radiographic appearance of diffuse indefinite radiolucency on the crest surrounded by sclerotic bone. The biopsy revealed hyaline coiled bands, which were diagnosed as *T. spiralis*. Hansen & Allard also found *T. spiralis* in biopsies of the buccal mucosa in a 68-year-old man and a 44-year-old woman. The carcinoma lesions involved the tongue in two patients and the floor of the mouth in the other two patients. The authors discussed the possibility of carcinogenesis and indicated there may be a relationship between trichinosis and oral squamous cell carcinoma.

2. **STRONGYLOIDIASIS** is a human parasitic disease caused by the nematode (roundworm) *Strongyloides stercoralis*, or sometimes *S. fülleborni*. It

can cause a number of symptoms in people, principally skin symptoms, abdominal pain, diarrhea and weight loss. In some people, particularly those who require corticosteroids or other immunosuppressive medication, *Strongyloides* can cause a hyperinfection syndrome that can lead to death if untreated. The diagnosis is made by blood and stool tests. The drug ivermectin is widely used in the treatment of strongyloidiasis. **No oral manifestations** of the disease have been reported. Oral changes secondary to anaemia may be seen.

3. **ANCYLOSTOMIASIS** (also **anchylostomiasis** or **ankylostomiasis**) is the condition of infection by *Ancylostoma* hookworms. The name is derived from Greek ancylos "crooked, bent" and stoma "mouth." *Ancylostomiasis* is also known as miner's anaemia, tunnel disease, brickmaker's anaemia and Egyptian chlorosis.. **Oral manifestations** due to direct invasion are extremely rare, although stomatitis and gingival inflammation may be seen. Oral features associated with severe anaemia, secondary to *ancylostomiasis*, are frequently seen.

4. **ENTEROBIASIS:** A **pinworm infection** or **enterobiasis** is a human parasitic disease and one of the most common childhood parasitic worm infections in the developed world **No oral**

**manifestations** have yet been reported but grinding of teeth is observed in heavy pinworm infection.

#### 5. **GONGYLONEMA:**

*Gongylonema pulchrum* is a small roundworm generally found in the digestive tract of reports of this organism in the oral tissues of humans. Stiles & Baker found the encysted form in the lower lip of an 18-year-old woman, and Waite & Gorrie reported the encysted form in the palate of a 30-year-old man. An unusual case of the adult form of the worm moving beneath the mucous membrane of what was described as the mandibular right buccal sulcus in a female patient was reported by Burrill et al. The tissues were anesthetized, and the live worm removed and submitted, and later identified as *G. pulchrum*. The last case associated with this roundworm was reported in 1956.

6. **ASCARIS (ASCARIS LUMBRICOIDES):** It lives in the upper part of the small intestine, is often referred to as the giant intestinal worm because it can grow to a length of more than 30 cm. There has been a single case report of this worm in the oral structures. Hiatt removed the remains of an adult female *A. Eumbricoides* from an asymptomatic swelling in the submental area of a 5-year-old boy. A persistent thyroglossal duct was considered to be the path of entry for the

parasite. In patients with heavy ascaris burden, patchy pigmentation of the dorsum of tongue and erosive buccal lesions might be seen.

**Filariasis (philariasis)** is a parasitic disease (usually an infectious tropical disease) that is caused by thread-like nematodes (roundworms) belonging to the superfamily Filarioidea, also known as "filariae". These are transmitted from host to host by blood-feeding arthropods, mainly black flies and mosquitoes. Eight known filarial nematodes use humans as their definitive hosts. These are divided into three groups according to the niche within the body they occupy:

- Lymphatic filariasis is caused by the worms *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*. These worms occupy the lymphatic system, including the lymph nodes; in chronic cases, these worms lead to the disease elephantiasis.
- Subcutaneous filariasis is caused by *Loa loa* (the eye worm), *Mansonella streptocerca*, and *Onchocerca volvulus*. These worms occupy the subcutaneous layer of the skin, in the fat layer. *L. loa* causes *Loa loa* filariasis, while *O. volvulus* causes river blindness.

- Serous cavity filariasis is caused by the worms *Mansonella perstans* and *Mansonella ozzardi*, which occupy the serous cavity of the abdomen.

The adult worms, which usually stay in one tissue, release early larval forms known as microfilariae into the host's bloodstream. These circulating microfilariae can be taken up with a blood meal by the arthropod vector; in the vector, they develop into infective larvae that can be transmitted to a new host. The subcutaneous worms present with skin rashes, urticarial papules, and arthritis, as well as hyper- and hypopigmentation macules. *Onchocerca volvulus* manifests itself in the eyes, causing "river blindness" (onchocerciasis), one of the leading causes of blindness in the world. Serous cavity filariasis presents with symptoms similar to subcutaneous filariasis, in addition to abdominal pain, because these worms are also deep-tissue dwellers. Oral manifestations include oedematous swelling of face and gingiva.

**C. LOIASIS: *Loa loa* filariasis** (also known as loiasis, loaiasis, Calabar swellings, Fugitive swelling, Tropical swelling and African eyeworm) is a skin and eye disease caused by the nematode worm, *Loa loa*. Humans contract this disease through the bite of a Deer fly or Mango fly (*Chrysops* spp), the

vectors for *Loa loa*. The adult *Loa loa* filarial worm migrates throughout the subcutaneous tissues of humans, occasionally crossing into subconjunctival tissues of the eye where it can be easily observed. *Loa loa* does not normally affect one's vision but can be painful when moving about the eyeball or across the bridge of the nose. The disease can cause red itchy swellings below the skin called "Calabar swellings".

## **PROTOZOA**

Protozoans are a diverse group of eukaryotic, unicellular animals. Parasitic species infect all vertebrates and many invertebrates. They have a major influence on human existence. **LEISHMANIASIS:** The leishmaniasis are visceral, cutaneous and (rarely) mucosal diseases caused by species and subspecies of protozoan parasites belonging to the genus *Leishmania*. These diseases are prevalent where sand-fly vectors and mammalian reservoirs exist in sufficient numbers to permit frequent transmission. **Clinical manifestations:** In the field of infectious diseases, the clinical signs, as a rule, broadly reflect the agent causing the infection. For some infections this is not clear-cut, and for leishmaniasis it is quite far from straightforward even if the various *Leishmania* organisms are often associated



with a fairly typical clinical picture.

**Cutaneous leishmaniasis:** Cutaneous leishmaniasis, often referred to as oriental sore, is a localized skin infection that does not spread beyond the site of inoculation.

**Mucocutaneous leishmaniasis:**

Mucocutaneous leishmaniasis is caused by *Leishmania brasiliensis brasiliensis*, a subspecies that usually invades the mucosal tissues, either through progressive growth or through metastasis, but which can also limit itself to localized skin lesions. This form of leishmaniasis has a predilection for the oronasopharyngeal areas to which it can metastasize within months of the first skin inoculation and where it can remain active for decades. **Visceral leishmaniasis:** Visceral leishmaniasis, often referred to as kala azar, is caused by *Leishmania donovani*, *Leishmania infantum* or *Leishmania chagasi*, which disseminate hematogenously to infect macrophages in the liver, spleen, bone marrow and lymph nodes.

**Amphotericin B** has been shown to be more effective than pentavalent antimony and it is presently the drug with the highest cure rate. Therefore, particularly in antimony-refractory zones, pentavalent antimony has been largely replaced with **amphotericin B**.

. Cutaneous leishmaniasis may cause lip or facial swelling. The mouth may be involved by direct extension from cutaneous leishmaniasis (oriental sore or chiclero ulcer). Oral lesions are, however, most frequent in mucocutaneous leishmaniasis and appear in patients who have defective macrophage function or cytokine production. The hard palate is typically involved (espundia), but lesions can spread to the soft palate, uvula and pharynx or, less commonly, to involve the gingivae and upper lip. A mid-facial granulomatous destructive lesion may result. Oral lesions seen in Sudan are typically caused by *L. donovani* and present with fungating oral lesions. Most patients complain of pain or of a sensation of a foreign body in the mouth, gingival bleeding or loosening of teeth.

**Diagnosis and management:** Clinical and serological (enzyme-linked immunosorbent assay or indirect fluorescent antibody) tests are useful in the diagnosis, but the demonstration of the parasites (Leishman- Donovan bodies) in biopsies or in smears is the most important and definitive aspect of diagnosis. Mucocutaneous leishmaniasis may heal spontaneously but, since there can be extensive destruction of tissue, chemotherapy is indicated. Pentavalent antimony (Pentostam@)N, -methyl

glutamine (Megluminem) antimonate (Glucantime®), etoconazole, amphotericin, or pentamidine isethionate are other therapies tried.

#### D. ARTHROPODS

Throughout their life cycle, arthropods may host parasitic organisms, serve as vectors of a wide variety of pathogens or cause direct tissue damage and disease in humans. The pathogenic effects are most pronounced in the tropics, but they also produce significant effects in the United States and other temperate climates. The phylum *Arthropoda* is large and includes more species than any other phylum. The term arthropod derived from Greek, means jointed foot.

##### 1. MYIASIS

Myiasis is the condition when fly maggots invade living tissue. The main families of flies involved are *Calliphoridae*. Conditions favorable to myiasis are present in both temperate and tropical areas, but it is most common in the tropics, mainly in people who sleep with their mouth open, have incompetent lips or are mouth-breathers such as people with learning disability or vegetative states. Lesions are thus mainly in the anterior maxillary or mandibular gingivae. An opening burrow is usually patent with induration of the marginal tissues and is raised forming a

dome-shaped “warble”, or an extraction wound may be affected. Often several larvae are present and there is severe inflammatory reaction in the surrounding tissues. Myiasis can be diagnosed by seeing the larvae with the naked eye. A few drops of turpentine oil or chloroform in light vegetable oil should be instilled in the lesion and the larvae removed with blunt tweezers. It may be prudent to give an antibiotic, as there is often a superimposed secondary infection. It is a general term for infection of any organ of the body by maggots that feed on dead or living tissues, The fly larvae of several families in the order *Diptera*, class *Insecta* of the phylum *Arthropoda* is pathogenic during their development within the tissues of infected hosts. The human myiasis infestations have been reported to occur in the skin, lip, nose, mouth, ear, gastrointestinal tract, anal and sexual orifices and urinary passages. Myiasis may be divided into two types. In primary myiasis, there is penetration of intact mucosa or skin by the larva, whereas secondary myiasis occurs when open wounds, infections or burns are parasitized. Species of flies that normally favor decaying flesh for larval development occasionally deposit eggs or larvae on wounds or ulcers. These feeding larvae may then cause tissue damage of significant consequence. Myiasis occurs mainly in the tropics and is associated with inadequate

public and personal hygiene. Oral myiasis, also known as **dental myiasis and gingival myiasis**, is a larval infection of tissues of the oral cavity. Oral myiasis is rare, and most cases have been reported from developing countries, particularly in Asia. The first two cases of oral myiasis were reported by Laurence in 1909. Oral myiasis has been noted in patients of a wide age range (9-78 years) and seems to have no predilection for either sex. The common predisposing factors for oral myiasis include the presence of an oral wound (such as an extraction site, severe gingivitis or periodontitis), halitosis and, in most instances, a history of mouth-breathing, especially while sleeping. It is presumed that the patients become infected with the fly larvae while sleeping. Most patients present with symptoms of pain, gingival swelling and bleeding and an “itchy” feeling in the involved site. Intraoral examination generally reveals the presence of active larvae, located within swollen, erythematous, bleeding oral tissues. In many cases, the larvae burrow into and

beneath the gingiva, leaving an orifice to the burrow, through which the larvae can exit. Treatment consists of removal of the larvae and copious irrigation of the tissues. Felices & Ogbureke suggest an ether solution to facilitate larvae removal. Antibiotics may be prescribed, and follow-up therapy, which should include treatment of the predisposing oral condition, is indicated. With increasing foreign travel, particularly into developing countries, the incidence of imported cases of oral myiasis, as well as other tropical infections may become more common

#### **CONCLUSION:**

The spectrum and prevalence of relevant infectious diseases has been increasing and a variety can present with gingival or periodontal involvement. Knowledge of these infections and infestations is essential to facilitate diagnosis and treatment.

#### **REFERENCES:**

1. S. R. Prabhu, D. F. Wilson, D. K. Daftary, N. W. Johnson. Oral Diseases In The Tropic. 125-153
2. Bhatia. Medical Parasitology. 2<sup>nd</sup> Edition
3. Ananthanarayan And Paniker. Textbook Of Microbiology. 7<sup>th</sup> Edition
4. Robert Bergquist. Parasitic Infections Affecting The Oral

- Cavity. *Periodontology* 2000, Vol. 49, 2009, 96–105
5. Yves Carlier, Carine Truyensa, Philippe Deloronc, Francois Peyron. Congenital Parasitic Infections: A Review. *Acta Tropica* 121 (2012) 55– 70
  6. L.H. Kasper And D. Buzoni-gatel. Some Opportunistic Parasitic Infections In Aids: Candidiasis, Pneumocystosis, Cryptosporidiosis, Toxoplasmosis. *Parasitology Today, Vol. 14, No. 4, 1998*
  7. Singh Sunita, Chhabra Sonia, Aggarwal Garima\*, Kalra Rajnish, Duhan Amrita, Sen Rajeev. Oral Cysticercosis-a Rare Presentation. *Asian Pacific Journal Of Tropical Medicine* (2011)587-588
  8. Amrita Jay A, Jagtar Dhandab, Peter L. Chiodini C, Charles J. Woodrowc, Paula M. Farthing D, James Evans E, H. Rolf Jager. Oral Cysticercosis. *British Journal Of Oral And Maxillofacial Surgery* 45 (2007) 331–334