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Review Article

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Pinworms Infection: Review

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Abstract

Enterobius vermicularis **or pinworms is one of intestinal round worm that cause enterobiasis or pinworm infection in humans. the parasite has wide spread than other helminth parasite and has been evaluated to infect about two hundred million individual worldwide annually. Life cycle of parasite is simple and has no intermediate or reservoir hosts ,it consist of three stages ; egg, larvae and adult worm . Egg is the infective stage while the adult worm is pathogenic stage which live in large intestine of host and put their eggs in folded of perianal region of patient .The main symptoms of illness are appendicitis ,itching around the anal region usually at night and nocturnal enuresis ,this symptoms are more common in infected children pinworm infection is related with some factors such as poor of personal hygiene , unsafe human waste disposal and inadequate of safe drinking water. the principal route of transmission is direct contact between infected and healthy human. The method of choice for detection of parasite is observed eggs by exam of stool sample microscopically also visualized of adult worm in stool by naked eye. The best drug against parasite is mebendazole given orally as a single dose.**

Key words: Enterobius vermicularis, pin worm, enterobiasis, parasite.

الخلاصة:

الديدان الدبوسية هي واحدة من الديدان المدورة التي تسبب داء اليدان الدبوسية في الانسان يمتلك الطفيلي انتشار واسع اكثر من باقي اليدان الطفيلية يصيب حوالي 200 مليون شخص سنويا حول العالم دوره الحياه بسيطة ولا تحتاج الى مضيف وسطي او خازن وتتضمن ثلاث مراحل هي البيضة واليرقة والدودة البالغة البيضة تمثل طور الإصابة بينما البالغة تمثل الطور الممرض والتي تعيش في الامعاء الغليظة للعائل والتي تضع بيضها في تلافيف منطقة المخرج للشخص المصاب اهم الاعراض المرضية هي التهاب الزائدة الدودية حكه حول منطقة المخرج عادة اثناء الليل وتبول لا ارادي ليلي هده الاعراض اكثر شيوعا عند الاطفال داء اليدان الدبوسية يتعلق ببعض العوامل مثل قلة النظافة الشخصية والصرف الصحي الغير امن والماء الغير صالح للشرب الطريقة الرئيسية لانتقال المرض هي الاتصال المباشر بين المصاب والشخص السليم افضل طريقة للكشف عن المرض هي فحص عينة البراز مجهريا وملاحظه الدودة البالغه في البراز عيانيا افضل علاج ضد الطفيلي هو الميترانيدازول يؤخد كجرعة واحدة فمويا

Introduction

Enterobius vermicularis is also known pin worms or seat worm or thread worms. Also it called Oxyuris vermicularis in the ancient times . It cause enterobiasis as intestinal parasitic infestation in humans ,that commonly occurs in children than adults. Enterobius vermicularis is a small worm live in the intestinal tract of man ,Greek word enteron is mean the intestine, bios mean life and vermiculus mean tiny worm. The Oxyuris refer to sharp tail, a feature of the adult female from which derived the name pinworm. Adult worm of parasite is reside in the intestinal tract feed on nutrients ingested by the host(Akkuş *et al*,2005) .

Enterobius vermicularis has wide geographical distribution than other helminthic parasite, it has been estimated to infect about two hundred million people worldwide anualy.E.vermicularis is one of nematoda worm infection is more common in temperate and cold arias in the world and high distribution in poor people of the tropics areas. the disease is high prevalent in kindergartens, school age children and orphanages large families(Sung, JF, *et al*, 2001).

life cycle of parasite exist in three stages ; egg , larvae and adult worm (male and female) .the parasite reproduce sexually and after mating within large intestine of host , the males dies while the females crawl down the intestinal bowel and out the anus where it lay eggs in the perianal area this may lead to sever itching around the anus usually at night and disturbances of sleep .Nocturnal enuresis is an important problem in children that has been related with enterobiasis(Sirivichayakul *et al* ,2002).

The infection caused by this parasite may be asymptomatic in most cases but some of patient may complain from pruritus anai, restlessness, insomnia, and irritability, especially in children. Enterobiasis or pinworm infection may lead to serious illness like as eosinophilic enterocolitis ,appendicitis and in sever cases may cause pelvic inflammatory disease or UT infection in females as ectopic lesions . Man acquire infection via direct contact with infected individual or ingestion of contaminated food and water contaminated with eggs of E.vermicularis and rarely by airborne way via inhalation of eggs(Rey, L., 2001).

Transmission by hands can also occur when contact with contaminated surfaces like as, bed linen ,bathroom and clothing . Enterobious vermicularis is related with some factors such as poor of personal hygiene , unsafe human waste disposal , poor sanitation and inadequate of safe drinking water. Infected people should be practice personal hygiene measures such as washing hands before eating or preparing food, keeping fingernails short, not scratching the perianal region, and not biting nails(Vleeschouwers W,et al 2013).

The good method for diagnosis of disease is a Scotch Tape test or Cellophane Tape test forscreening of fresh stool examination since the egg stage can be demonstrated in about five present of fecal sample , In other words, the prevalence of enterobiasis is generally underestimated due to the difficulty of demonstrate eggs by microscopic stool examinations ,therefore examining of stool samples is not recommended because pinworm eggs are sparse.

The treatment of choice for enterobiasis and effective drugs are mebendazole and piprazine , the treatment must be repeated to prevent new infection that caused by autoinfection((Rey, L., 2001) .

Etiology:

The infections more common in children, but can occurs in any individual and in any age is vulnerable to E. vermicularis illness . The infection with this parasite commonly occurs within families and transmitted in people who are live in crowded environments. People in tropical climates and children within school-aged are the most susceptible.the main way of infection is transmitted by the ingestion of the pinworm eggs. Transmission is most common via the oral fecal route .risk factors for E. vermicularis infection include poor personal hygiene, eating and drinking after contact with contaminated things and living with an persons who is identified as positive eggs (Chen KY, *et al* ,2018) .

Epidemiology:

Enterobius vermicularis or pinworms is considered to be the more common intestinal parasitic nematodes infect humans. About two

million of people are estimated to be infected by this parasite especially occurs in children aged five to ten years old accounting for more than thirteen present of cases. the infections occur with high frequently in school ages or preschoolaged , the disease is more common in children younger than eighteen years old and high prevalent in crowded place(Kubiak K *et al*, 2017). The parasite infect females more than males, the female to male infection frequency is one to two. The infection is seen in female usually between the ages of five to fourteen years old. . The infection is also commonly seen in individuals who institutionilized and take care of children. the center for disease control and prevention data indicates that there are approximately forty million people estimated to have been Enterobiasis in the united states. mode of transmission can occur via contact with contaminated personal care products ,bedding ,clothes, and furniture. transmission by oral fecal route is the most common while rarely transmission can occur through inhalation egg stage with mode and then swallowed to reach intestinal tract(Muge *et al* ,2008) .

Enterobiasis or pinworm infection is high prevalent parasitic disease with an evaluated one thousand million case report worldwide .the parasite is to most helminths infect the intestinal tract when compared with other helminthic diseases, the prevalence of Enterobiasis is underestimated because of the eggstage difficult to demonstrate in fresh stool microscopic examination and adult worm of parasite migration during the night(Laoraksawong P,*et al*,2018), (Lohiya GS, *et al*,2000) .

Morphology

Eggs:

The fully embryonated eggs are infective to man. The eggs are colorless, measuring about 50to60 microns in length and 20 to32 micron in breadth. The appearance is plano convex, one side is flattened and the other is convex. The shell are transparent, thin, hyaline, composed of two layers of albumins material. The egg stage when laid contains a full developed coiled larva and become infective to humans within six hour after exposure to atmospheric oxygen. Eggs of Enterobius vermicularis more resistant to antiseptics and can floats in saturatedsaltes solution(Cook G,1994).

Figure (1) Enterobius vermicularis egg in stool sample is detected microscopically . Contributed by Centers for Disease Control and Prevention (Public Domain)

The female

The adults female are small in size measuring about eight to thirteen millimeter long and 0.3 to 0.5 millimeter wide, white in color, fusiform worms with pointed ends, looks like a bits of white thread. true buccal capsules is absent. The mouth is found in the anterior end of parasite has three lips, one dorsal and two ventro-lateral and surrounded by pair of wing-like cuticular expansions known as cervical alae, which are transversely striated. The esophagus has a double bulb structure, this feature considered characteristic to E.vermicularis worm. It is posterior third is drawn into a thin pointed and tail like pin . in front of the middle third of the parasite the vulva is situated and opens into vagina which leads to the ovaries, oviducts and two uteri. mature female, virtually the whole body is carrying the distended uteri filled with eggs (Norhayati M *et al*, 2003).

Figure (2) female of Enterobius vermicularis

The male

The anterior end of male similar to that of female.The size of male is about 2 to 5 millimeter length and 0.1 to 0.2 millimeter wide. The body is cylinder in shape and white in color. The tapering, blunt posterior end of adult male has single copulatory spicule. The male is commonly dies after mating and is passed in the stool of patient(Norhayati M *et al*, 2003).

Figure (3)male of Enterobius vermicularis

Life cycle:

The simple life cycle of *E. vermicularis* is completed in single host (Human as definitive host).not required intermediate host in life cycle

Man become infected with *E. vermicularis* by ingestion of the fully developed eggs .The egg shell is dissolved by gastric juices and the larva release in the bowel of small intestine then they migrate to the large intestine in caecum as well as vermiform appendix, and they develop to adult worms within fifteen to thirty days of infection. Females may produce the pheromones to attract with males.The male coils around the female worm by its curved tail over the genital pore(Muge *et al* ,2008) .

Males hold female during copulation by using copulatoryspicules. after fertilizing proses the male will dies immediately while the females move to the perianal area at night to lie the eggs, the body temperature of the infected person and air acts as stimulant factors for laying eggs , therefor the female only lays eggs on the perineum region .The eggs has ability to spread out over the perianal area.

Eggs trapped in perianal skin or folds may hatch out to give larval stage and may enter intestinal tract directly from the anus. The process is known as retroinfection.

Occasionally larval stage may enter the vulva of infected womenand and infect the vagina. the life-cycle of E . vermicularis is complete within two to three weeks(Fleming CA, *et al*, 2015).

Mode of transmission:

human beings with enterobiasis are only source of infection. No reservoir host known extra human .the infection is very common affect children and intra family transmission. also handling of contaminated night clothes of children . the person is infected with enterobious by inhalation of eggs present in the dust . In adults retro infection is occasionally seen. Ingestion of eggs due to contaminated nails and during itching of the perianal skin it transmitted by hand to mouth , commonly seen in children(Waugh MA,1974).

Hosts:

E. vermicularis is a nematodes generally exhibit high host specificity. Man are considered to be the only host for this parasite , Occasional the

parasite have been reported in chimpanzee(Wang *et al*, 2016).

Habitat:

The adult worm of Enterobious vermicularis or pin worm is resides in large intestine (caecum ,vermiform appendix and ascending colon) of man , They generally attach on the mucosa surface and occasionally enter in the submucosalaye(Wang *et al*, 2016) .

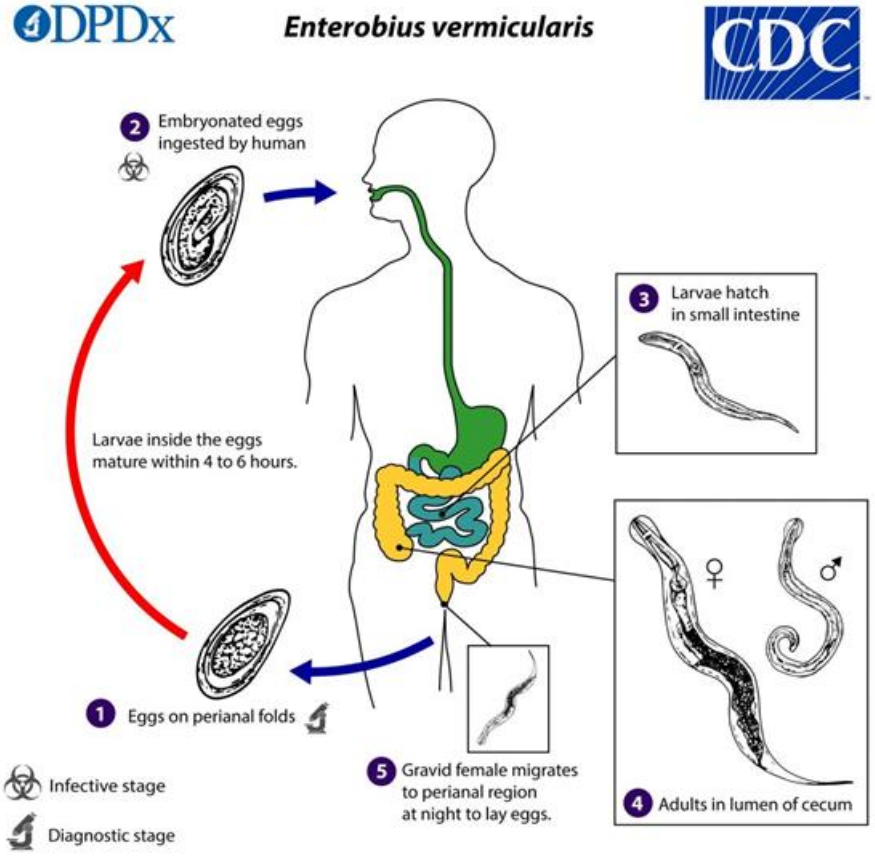

Figure (5) life cycle of Enterobius vermicularis

Pathogenicity :

Enterobius vermicularis is parasitic nematodes that commonly resides in the cecum and ileum region of intestinal tract . Once *the* egg stage are ingested, they take about

one to two month to reach sexual maturity adult worms which live in the intestinal bowel. The worm do not cause any clinical symptoms when confined to the ileocecal region. the female adult worms move to the anal skin usually at night time and lying numerous number of eggs in the perianal skin. this migration lead to pruritus anai. eggs hatch near the anal region ingested of eggs by autoinfection and repeating of the life cycle of the same individual . sometimes the larvae may be migrate back into the rectal area and to the lumen of small intestine and start a new life cycle this known as retro infection(Grencis R and Cooper E, 1996).

Pathogenicity due to egg stage:

main pathological symptoms and lesions are caused by the adhering of the eggs on surface of the perianal area and this factor lead to pruritic anai or itching of perianal skin(Roberts, L.S., and Janovy Jr., J., 2000).

Pathogenicity due to adult stage:

The adult worms make attachment to the mucosa and feeding on content of the large intestine (epithelial cells and bacteria) this lead to small ulcerative lesions which may causing moderate catarrhal inflammation, eosinophilia, diarrhea and secondarybacterial infection . the infection are characterized by sever perianal itching.

Infected person scratch themselves attempting to relieve the itching and this lead to causing skin damage, bleeding, intensified itching and secondary bacterial infections, allergic

manifestation in the sensitized patient that result from absorption of metabolites product released by the adult worms. (Garza-Serna U *et al*, 2016).

Clinical picture and diseases:

Usually most of cases with enterobiasis are without symptoms , in symptomatic patients, the more common clinical picture is pruritus of perianal area in the early morning or in nocturnal, this occurs due to crawls of adult females out of the anus area to lay eggs. Other clinical symptoms like as irritability , abdominal pain, and restlessness.in case of heavy infections especially in children may result in behavioral disorder such as disturbance of sleep or insomnia , anorexia, nausea and grinding the teeth at night time or nail bite .nocturnal enuresis in children is sometimes occurs (Garza-Serna U *et al*, 2016).

Complications: The adult worm migrate to the vagina and vulva and causes irritation ,inflammation and mucoid discharge. Also it may crawling up to the uterus then reach to the fallopian tubes and into the peritoneum cavity .This may lead to urethritis chronic salpingitis, and endometritis. the adult female worm is sometimes present in during surgically removal of appendix and this responsible for appendicitis(Martin RF,2016).

Diagnosis:

Diagnosis of enterobiasis or pin worm infection depends on the detection of the egg stage of parasite or adult worm. eggs are found in the stool only in a small proportion of patients therefore stool examination is not necessary in diagnosis. Stool examination detects about five present of intestinal infection cases in contrast with other parasitic disease caused by gastrointestinal helminth. Adult females are deposited eggs in large numbers on the perianal and perineal region usually at night and can be detected in swabs collected in early morning, before defecation or washing. The swabs from perianal folds are usually positive(Roberts, L.S., and Janovy Jr., J., 2000)

Identification of adult worms :The adult female and male of Enterobius vermicularis live in the caecum of the human large intestine. Adult worms may be observed in perianal skin shining under bright light when close visual examination are conducted at night or in early morning. The adult worms may be seen on the surface of fresh stool specimen during garments, perianal folds(Sung, JF, *et a,l* 2002).

demonstrates cross sections of the adult worm in a biopsy taken in such instances. Stool examination detects about five present of intestinal infection cases in contrast with other gastrointestinal helminthic diseases(Surmont, I.,and Liu, L.X., 1995).

Identification of egg stage:

Microscopic identification of characteristic eggs by scrapings of perianal area is the best method for demonstrated of Enterobious vermicularis eggs.

Because of the anal itching is a common clinical feature of pinworm infection, the third option for diagnosis is collected samples from under fingernails of patient and exam it under microscope to observe eggs(Russell L,1991).

The gold standard method of diagnosis eggs of pin worm is the Cellophane Tape test or Scotch Tape test. The method done by direct application of clear cellophane tape to the perianal skin and then put it on a glass slide and then microscopic examination to demonstrate eggs. the sample should be collected in early morning before defecation or bathing to obtain good result. The sensitivity of this test is about ninety percent when 3 stool sample collected in three days consecutively and examined microscopically to observe eggs of parasite(Friesen J, *et al*, 2019) .

Treatment

the treatment of enterobiasis include several effective drugs are available for parasite. ther are ; mebendazole, albendazole and Pyrantel pyrvinium ,these drugs can be given as single dose therapy (Yang CA,*et al* 2017). Piperazine drug can be administrated daily for one week. the treatment must be repeated after two weeks to avoid auto-infections and to eliminate all newly formed worms . usually enterobiasis affects a group therefore necessary treat the whole member of family at the same time(Humes D, and Simpson J 2006) .

Prevention:

- Good personal hygiene is more effective way of prevention like as washing of hands with soap and warm water after toilet and cut

fingernails regularly and don't itching the anus area or biting the nails.

- The underwear clothing and bed linen of infected children should be changed every morning.
- bed linen and clothing should not be shaken to avoid contaminating the air environment, also should be cleaning in hot water and dried in a high temperature to destroy any eggs that may be found .
- Control of pinworm infection can be difficult in schools and institutions, day care centers, , but mass treatment during an outbreak of disease may be useful
- Health education such as teach children the importance of washing hands before meal to prevent infection(Sung, JF, *et al* 2002).

Conclusion :

E.vermicularis is the causative agent of enterobiasis that mainly affects children and high spread parasite infection, E.vermicularis is very important helminthic parasite of human health in developing countries and commonly increased with some factors mainly overcrowded conditions in family groupings, hospitals ,daycare centers, schools and orphanages . inspite of the wide range of effectiveness on the validity of human host, E.vermicularis still a careless as parasitic illness infect large numbers of humans . The prevalence and insistence associated with control planning to eliminate the parasite still restricted, personal hygiene measures like as washing the hands before meal or preparing food, keeping fingernails short that lead to reduce of transmission of parasite infection . more future studies on the mechanism of reduction of infection and strategy for good control measure should be taken to eliminates the enterobriasis are required.

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