

# Isolation of *Moniliformis moniliformis* parasite from Brown Rats (*Rattus norvegicus*) in South of Iraq

Amal Khudair Khalaf

Department of Microbiology, College of medicine, University of Thi-qar, Iraq

\*Corresponding author: Khalaf

Email: [amalkhudair111@yahoo.com](mailto:amalkhudair111@yahoo.com)

## Abstract:

*Moniliformis (M) moniliformis* is rodents- born parasitic disease where rats and mice acts as definitive hosts for the parasite and it is rare in Iraq especially among human who also acts as definitive host for the parasites. The infection rate was reported 1\108 (0.01%) of infection with *M. moniliformis* during the examination of the trapping brown rats of species *Rattus norvegicus* based on the current study. The sexes of the adult worm are separated or dioecious where the male is different from the female, the worm has white to creamy color and its size ranged between 130- 133mm, the anterior end of the parasite is started with proboscis or spiny head followed by a trunk. The measures of the cylindrical proboscis are 0.40 × 0.21 mm and it is armed with 13 rows of hooks which is curved and presents in a number of 7 in each row. Trunk is seems to be pseudo-segmented in shape where it is consist of lines that regulates horizontally. The body cavity is absent and without alimentary canal, the posterior end of female adult worm is straight while the male has a curved posterior end with copulatory spicules. The egg of *M. moniliformis* has different size ranging between 0.1-0.5 mm; it is oval in shape, contain four hooks and covered with three membranes.

**Keywords:** *Moniliformis moniliformis* , isolation, description, brown rats , Iraq

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## Introduction:

*Moniliformis (M) moniliformis* is distributed in many part of the world where it have been reported in Iran , Saudi Arabia, Iraq , Japan, Russia , Italy, Sudan , Egypt , Indonesia, Bangladesh, Palestine ,Pakistan and America (Al-Rawas *et al.* 1977 ; Beaver *et al.*, 1984; , Sahar *et al.*, 2006; Berenji *et al.*,2007 and Marachi, *et al.*, 2014) . Rodents that belong to the order of Rodentia are consist 43% of the total number of mammalian species (Huchon *et al.*, 2002) . Rodents like mice and rats and human act as definitive host for this acanthocephalian parasite while cockroaches and beetles acts as intermediate host when harbor the larval stage of parasite since *M. moniliform*

is has a complex life cycle through indirect transmission by ingestion of the infected beetles and cockroaches from the definitive host (Gibson 1998; Meyers *et al.* 2000) . Acanthocephaliasis is a rodent – born disease causes diarrhea, abdominal pain, pallor, fatigue , loss of weight and irritability in definitive host or it may be a symptomatic (Marachi, *et al.*, 2014).

Thorny-headed worm is a common name of *M. moniliformis* where it has an anterior end with a hooked proboscis (Sahar *et al.*, 2006). *M. moniliformis* has a segmented appearance but without segments that consist the body of worm. It has a white or creamy color, separated sexes of male and female with 40-130 mm body length for male and female with 100 -270mm length of body (Marty, 1998). It is intestinal endoparasitic species lives in the gastrointestinal tract of rats, mice , dogs and human as definitive host for adult worm where the fertilization occur to release the eggs as mean for reproduction ( Marty, 1998 ; Sahar *et al.*, 2006).

Prevention can be achieved through avoid the direct contact with canine and feline families which are harbor the insect or beetles and cockroaches on his body and transmitted it for human and other hosts, damage the clay houses and cleaning of the house from insects that act as intermediate host of the parasite (Marachi *et al.*, 2014).

The studies are less described the morphology of parasite *M. moniliformis* , so the current study was aimed to explain the main characters of this parasite after isolated it from brown rats in Iraq and shown its distribution.

#### **Materials and methods:**

##### **- collection of sample:**

A number of 108 brown rats were collected from Nassirriyah city, southern Iraq during a period of 2017- 2018 using a metal traps that made locally as captures for rodents and supported with a piece of bread for attracting the rats (Dada ,2015). Traps were placed in domestic corridors, kitchens, local gardens, and lands. The metal traps with captured rats were transported to the laboratory of microbiology department, college of medicine; university of Thiqr and it were examined for identification where it found brown rats of species *Rattus norvegicus* (Meerburg *et al.*, 2009). Brown rats of species *Rattus norvegicus* were dissected after anesthesia with diethyl ether and separation of gastrointestinal tract for isolation of *M moniliformis* parasite , the content of large and small intestine were collected and examined macroscopically and microscopically , placed in petri-dish contain a physiological normal saline and then centrifuged at 3000 rpm for 10 min. the sediment of a centrifuged intestinal content were examined by light microscope for differentiate the eggs of *Moniliformis moniliformis* parasite (Dada ,2015).

##### **- Parasite Fixation and drawing:**

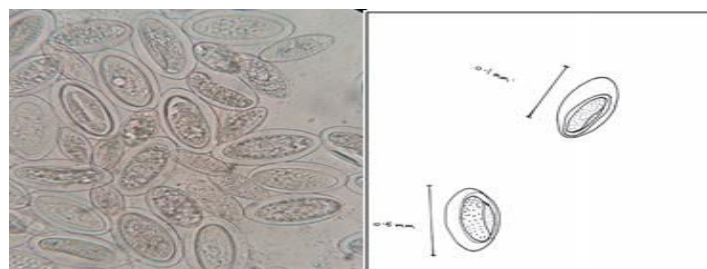
Isolated *M moniliformis* from brown rats of species *Rattus norvegicus* were transported to physiological saline for relaxation and then it was fixated over night by a solution of A.F.A or alcohol formalin acetic acid, kept in a mixture of (70%) alcohol and glycerin . clarification of specimen were done by mounting it permanently in a pure glycerin (Abdullah 1988). camera Lucida was used for drawing of parasite adult worm based on Yamaguti(1963) method. The measurements were done in millimeter.

### Results:

The results of the following study were reported 1\108(0.01%) of infection with *M. moniliformis* during the examination of the trapping brown rats of species *Rattus norvegicus*. The sexes of the adult worm are separated or dioecious where the male is different from the female, the worm has white to creamy color and its size ranged between 130- 133mm, the anterior end of the parasite is started with proboscis or spiny head followed by a trunk. The measures of the cylindrical proboscis are 0.40 × 0.21 mm and it is armed with 13 row of hooks which is curved and presents in a number of 7 in each row. Trunk is seems to be pseudo-segmented in shape where it is consist of lines that regulates horizontally. The body cavity is absent and without alimentary canal, the posterior end of female adult worm is straight while the male has a curved posterior end with copulatory spicules . The egg of *M. moniliformis* has different size ranging between 0.1-0.5 mm, it is oval in shape , contain four hooks and covered with three membranes .



**Fig(1):** adult worms and ova of *Moniliformis moniliformis*



**Fig(2):** eggs in different size of *Moniliformis moniliformis*



**Fig(3):** typical shape of *Moniliformis moniliformis* from rats

## Discussion :

Rats have been reported as a harbor for many intestinal species of parasite like *Hymenolepis nana* , *Strongyloides stercoralis* , *Taenia taeniaformis*, *Strongyloides ratti*, *Trichinella spiralis* and *Moniliformis moniliformis* . domestic rats are capable for transmission of zoonotic infections (Egbunu and Dada,2016 ) .rats serves as a reservoir many pathogens that can be transmitted to human where there are close proximity between human and rats living (Lindoet *et al.*, 2002).

*Moniliformis moniliformis* was isolated from brown rats of species *Rattus norvegicus* during this study where achieved in Nassirriyah city , south of Iraq and it was described to explain its main character or morphology . poor health , public and personal hygiene , low socioeconomic state , presence of insect rural habitat and urban environment are main factors that leads to infection with pathogens like *M. moniliformis* among human , rats or other rodents ( Berenji *et al.*, 2007 ; Messina *et al.*, 2011).

The body of *M. moniliformis* seems to be segmented shape where consist of line of pseudo-segments similar to that reported or described by Sahar *et al.*(2006) ; Salehabadi *et al.* (2008) and Marachi *et al.* (2014) . *M. moniliformis* has white or creamy in color similar to that reported by Marachi *et al.* (2014) and Marty (1998). It has a length ranged between 130-133mm and agreed with that explain by Marachi *et al.* (2014) when reported the size of this parasite is 60-180mm . infected child in Saudi Arabia was harbor *M. moniliform is* female with 133mm in size (Sahar *et al.* 2006) but it has 125mm of female length that reported in Iran by (Salehabadi *et al.* ,2008).

The anterior end of *M. moniliformis* has a hooked proboscis with measures of 0.40 × 0.21 mm and it is bear on neck or trunk , proboscis contains 13 rows of hooks each row with 7 hooks and this results were disagreed with Salehabadi *et al.* (2008) in Iran when studied the morphology of *M. moniliform is* and showed a different results after describing the proboscis of parasite was armed with 14 rows of hooks distributed as 6-8 in each row . Sahar *et al.* (2006) have explain the function of proboscis for the attachment of the parasite to the wall of intestine of host where present for parasitism and this submitted a similar study about the structure of proboscis compared with the current study where achieved in Saudi Arabia on the morphology of *M. moniliformis*.

The egg of *M. moniliformis* has oval shape, three membranes, four hooks and it is vary from 0.083 to 0.116 mm in size. Egg is the diagnostic stage of *M. moniliformis* can be diagnosed microscopically in stool of final host like rats or human, the results about the shape of egg of *M. moniliformis* similar to that described by Sahar *et al.* (2006) and Marachi *et al.* (2014) . the current study were confused through the examined the egg of *M. moniliformis* with *Enterobius vermicularis* similar to that confusion occur with Sahar *et al.* (2006) when examine the egg of *M. moniliformis* and found it similar to the egg of *Ascaris lumbricoides* during examine the stool sample or intestinal contents of host, so the macroscopically diagnosis for the adult worm of *M. moniliformis* is prefer to enhance the final results.

### Conclusions:

- 1- This parasite is similar to that reported in human so it is considered zoonotic.
- 2- Rats can spread the infection for other final host through insects.

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