

## ESTIMATION OF THE SOME TRACE ELEMENTS LEVELS IN THE FLUID OF *CYSTICERCUS FASCIOLARIS* LARVA OF *TAENIA TAENIAFORMIS*

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**ABSTRACT :** Cysticercosis infection is target high range of animals as well as human as intermediate host for the parasitic cestode *Taenia taeniaformis*. So the current study deals with investigate the concentrations and levels of some trace elements that benefit for parasite growth and it is found that Ca, Cu, Fe, Mg, Mn, Cd, Ni, Na, Pb, Zn, K, P, Co and Cr in the fluid of the larval stage or *Cysticercus fasciolaris* by atomic absorption spectroscopy where some of them are present in high levels like Ca, Cu, Fe, Mg, Mn, Cd, Ni and Zn but Pb, Na, K, P, Co and Cr were found at low levels including 713.4, 700.2, 643.08, 593.8, 552.4, 401.8, 211.32, respectively and 102.5 µg/ml for each of Ca, Cu, Fe, Mg, Mn, Cd, Ni and Zn, respectively while Pb, Na, K, P, Co and Cr levels are 88.93, 81.6, 51.74, 44.2, 38.9 and 31.11 µg/ml for each one of them.

**Key words :** *Cysticercus fasciolaris*, trace elements, atomic absorption spectrum.

### INTRODUCTION

*Taenia taeniaformis* (Cestoda : Taeniidae) are long, segmented, parasitic tapeworms, it is a parasitic cestode of cats that uses rodents as intermediate hosts (Tucek *et al*, 1973; Georgi and Georgi, 1990). These parasites have an indirect life cycle, cycling between a definitive and an intermediate host. *Taenia taeniaformis* infects mainly carnivores of the families Felidae, Canidae and Mustelidae, including domestic cats and dogs (Tucek *et al*, 1973; Hanes, 1995). The intermediate hosts of *T. taeniaformis* include the mouse, rat, cat, muskrat, squirrel, rabbit, other rodent, and bat. Also, some sporadic cases of human infection have been reported from Argentina, the former Czechoslovakia, Denmark and Taiwan (Nichol *et al*, 1981; Ekanayake *et al*, 1999).

*T. taeniaformis* was initially described in the 1700s; however, an association between the implantation of larvae and the formation of liver tumors in rats was not postulated until the early 1900s. Previous reported cases have been in laboratory or wild rats. Here, we present a case of *T. taeniaformis*-induced metastatic hepatic sarcoma in a pet rat (Roux *et al*, 1906). Infection with the larval form of *T. taeniaformis* is called cysticercosis. The larvae of these organisms are called *Cysticercus fasciolaris* (Woolley and Wherry, 1911; Gardiner, 1999).

So, the current study is deal with study of the chemical composition of the cystic larva of *Taenia*

*taeniaformis* from some electrolytes or trace elements using experimentally infected mice and to explain the function of these metals for the parasite. Since, trace elements are essential components of biological structures, but they can be toxic at high concentrations or beyond those necessary for their biological functions.

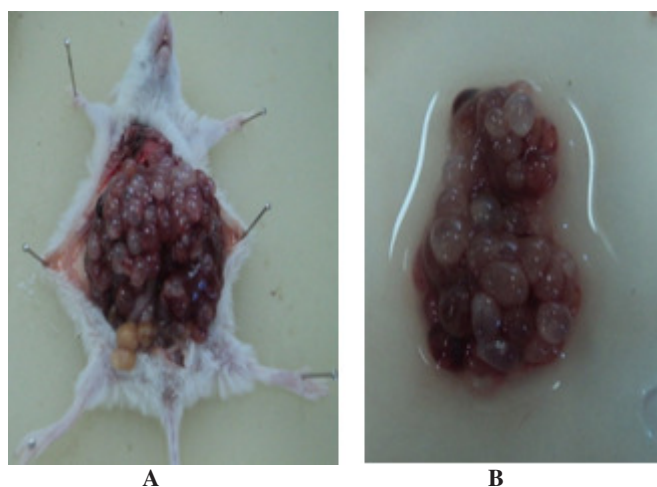
### MATERIALS AND METHODS

#### Source of *Cysticercus fasciolaris* and experimental infection

A number of cats were dissected to obtain the adult worm of the cestode *Taenia taeniaformis*, which removed from cat gut and placed in Petridis that supported with normal saline, then after, the grinded segments of the adult worm were removed and dissected to get the eggs. Finally, the eggs were experimentally ingested to albino mice Balb\C strain using stomach tube and left for about month to get infection with the larval stage of parasite or cysticercosis in liver (Benson and Talaro, 1996; Bowman *et al*, 2002).

#### Aspiration of the fluid from *Cysticercus fasciolaris*

Infected mice with cysticercosis were examined and dissected after month-post infection (Fig. 1). *Cysticercus* fluids were aspirated by 1ml syringe volume and provided to atomic absorption examination. About of 0.5-1 ml from *Cysticercus* fluid (0.5-1 ml) was mixed with an equal volume of acid digestion mixture (perchloric acid and nitric acid) in the small plastic tube. In order to enhance the



**Fig. 1 :** A-Infected mice with *Cysticercus fasciolaris* after month-post infection, B) liver of mice with *Cysticercosis*

digestion rate, the sample was shacked for one minute. Then digestion was placed in an oven for 48 hours at 37°C and finally a clear formed solution was diluted by 1:10 ml by deionized water and provided for atomic absorption (Mahdi *et al*, 2010).

## RESULTS

The experimentally infected mice were examined after month-post infection and reporting the infection with *Cysticercus fasciolaris* in liver (Fig. 1).

The reported electrolytes were Ca, Cu, Fe, Mg, Mn, Cd, Ni, Na, Pb, Zn, K, P, Co and Cr during this study in the fluid of the larval stage or *Cysticercus fasciolaris* by atomic absorption spectroscopy where some of them are present in high levels like Ca, Cu, Fe, Mg, Mn, Cd, Ni and Zn but Pb, Na, K, P, Co and Cr were found at low levels including 713.4, 700.2, 643.08, 593.8, 552.4, 401.8,

**Table 1 :** Trace elements of *Cysticercus fasciolaris* fluid after month – post infection.

Trace elements	Concentration in <i>Cysticercus fasciolaris</i> fluid (µg/ml)
Ca	713.4
Cu	700.2
Fe	643.08
Mg	593.8
Mn	552.4
Cd	401.8
Ni	211.32
Zn	102.5
Pb	88.93
Na	81.6
K	51.74
P	44.2
Co	38.9
Cr	31.11

211.32 and 102.5 µg/ml for each of Ca, Cu, Fe, Mg, Mn, Cd, Ni and Zn respectively while Pb, Na, K, P, Co and Cr levels are 88.93, 81.6, 51.74, 44.2, 38.9 and 31.11 µg/ml for each one of them, these previous results are listed at Table 1.

## DISCUSSION

The biological structure of organisms required the role of trace elements as essential component for it, in condition, if it found at high levels more than of its necessary it will be toxic and may killed the organism. So, the presence of the trace elements in the fluids of any organism must be regulated, deficiency or excess are not preferred and both can killed the organisms (De Oliveira *et al*, 2001; Shaeffer, 2006).

The trace elements activities are strongly associated with the biological system like its pond to protein and metalloproteins formation. The role of this metals in metalloproteins are join to the protein to be transported to their target site in the organism have storage and structural functions or can be part of enzymatic system (Srivastav *et al*, 2011).

The Ca, Cu, Fe, Zn, contents in *Cysticercus fasciolaris* fluid are high in comparison with other. So that similar to that result reported by Srivastav (2011) in content of *Fasciolopsis buski* body which is found high level from iron in the body of this worm (Srivastav *et al*, 2011). The importance of iron is shared with a wide variety of biological processes like its action in cataclysm or cofactors since iron was found in the intestinal cells of many helminthes as inorganic deposits (Fraga, 2005).

Some of helminthes has zinc (Zn) in their body structure or fluids like *Fasciolopsis buski*, *Fischoederius elongatus*, *Gastrodiscoides hominis*, *Fischoederius cobboldi*, *Gastrothylax crumenifer*, hydatid cyst and *Orthocoelium* as in *Cysticercus fasciolaris* that reported in a current study since this metal is required for DNA initiation and protein synthesis (Fraga, 2005). So, Zn availability in the nucleolus leads to be increased the synthesis of mRNA and this in turn causes increased availability of enzymes for DNA synthesis or transcription of DNA into RNA (Fraga, 2005; Srivastav *et al*, 2011).

The Ca, Cu were high in fluids of *Cysticercus fasciolaris* and they are play an important role in developing of the connective tissue, bones and nerve covering like that importance of K and Na which also reported in the current study, but in low levels in comparison with a previous metals (Aggett, 1994; Ozen *et al*, 2009). Ca, Cu, K and Na acts as a reluctant in the cytochrome oxidase, the enzymes superoxide dismutase,

dopamine hydroxylase and other oxidases that reduce molecular oxygen. The same results were also found in *Fischoederius cobboldi*, *Gastrothylax crumenifer* and *Orthocoelium orthocoelium* parasites, but lowest in *Fischoederius elongatus*, *Gastrodiscoides hominis* (Aggett, 1994; Ozen *et al*, 2009; Srivastav *et al*, 2011).

The all forms of life are needed to Manganese and Magnesium as an essential trace nutrient like the synthesis of glycoproteins, polysaccharides and sterol by Mn and the best known manganese-containing polypeptides may be arginase, the diphtheria toxin and Mn-containing superoxide dismutase (Mn-SOD). The presence of Mg in high amount is essential for the shape of the cell during cleavage and for Intercellular ionic bridging changes at the cell surface (Ozen *et al*, 2009).

Ni, Co, Cr, Pb, P and Cd have recorded in a lowest level in the fluids of *Cysticercus fasciolaris*. In comparison with the previous metals but similar to that found in *Fasciolopsis buski* and *Gastrodiscoides hominis*, *Fischoederius cobboldi*, *Gastrothylax crumenifer* and *Orthocoelium orthocoelium*. Each of the this metal has an essential role in cell structure and other biological activities, for example, the deficiency of chromium leads to several dysfunctions, but it is necessary for the structure and metabolism of nucleic acids. *In vitro*, Ni has been reported as activator or enhancer for some enzymes activity. Cd is known to be very toxic to man as affects the reproductive organs and also it accumulates in kidneys in small amounts. Cd and Pb importance is by affects everyone on the systems of the body's organ, like the nervous system, bones, the kidneys and the cardiovascular, immune and reproductive systems (De Oliveira *et al*, 2001; Srivastav *et al*, 2011).

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