

## Original Research Article

# Impact of Enterobiasis on some physical & hematological indices among children in Iraq-Babylon Province

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## ABSTRACT

Enterobiasis is a public health problem which is most common in children particularly in the temperate and tropical regions. The disease is caused by a pinworm parasite, *Enterobius vermicularis*, which commonly infects children rather than adults. This study aims to clarify the impact of Enterobiasis on some physical and hematological indices among children in Iraq-Babylon province. During the period from the 1<sup>st</sup> of April to the last of September, a total of (56) children were diagnosed to have Enterobiasis by using direct microscopic examination for the observation of the helminth's eggs in the stool. PCV and Hb were measured for all participants by hematocrit. WBC count was achieved to determine the leukocytosis associated with Enterobiasis. The weight was measured for all children and applied on the growth chart for measuring weight for age centile. Statistical analysis showed that there was no statistical difference between the mean age of the patients ( $5.58 \pm 2.76$  years) and controls ( $4.9 \pm 2.9$  years) ( $t=12.26$ ,  $df = 55$ ) and about (51.8%) of affected children were preschool and the majority of these cases (69.6%) were females. There was a significant difference in the growth parameters between the cases and controls ( $p < 0.001$ ); more than 80% of the cases were below 50 centile on the growth chart. There was a significant decrease in the mean PCV of the cases ( $34.35 \pm 3.62$ ) when compared with the control group ( $39.41 \pm 2.17$ ) ( $p < 0.001$ ), also the mean Hb for cases ( $11.08 \pm 1.21$ ) was significantly decreased when compared with that of the controls ( $12.83 \pm 0.74$ ). The study revealed that 45 (80%) of the affected children had eosinophilia when differential WBC was achieved.

### Keywords

Enterobiasis;  
*Enterobius vermicularis*;  
hematocrit;  
PCV and Hb.  
Eosinophilia  
helminth's  
eggs

## Introduction

### Enterobiasis

*Enterobius vermicularis* (pinworm) is the causative agent of enterobiasis, it is a parasite which is more common in

children worldwide, particularly in the temperate and tropical regions. It is estimated that 200 million people are

infected annually. This worm is commonly found in crowded institutions such as day-care centers, schools, hospitals and orphanages (Gülnoz C. and Nizami D, 2006).

*Enterobius vermicularis* is an important helminthic infection among children in rural areas of developing countries. Enterobiasis is frequently asymptomatic. The most typical symptom is perianal pruritus, especially at night, which may lead to excoriations and bacterial super infection (Finn, 1996), (Grencis RK and Cooper ES, 1996).

A high prevalence of enterobiasis can be detected in children with low socioeconomic status, and this infection affects the general health as well as the intelligence of the infected children (Avolio *et al.*, 1998), (Bahader *et al.*, 1995).

Pin worm infection is commonly spread in day care centers and elementary schools (Kang *et al.*, 2006). The principle mode of transmission of worm is direct contact between infected and uninfected persons (Burkhart, 2005), and its infection usually occurs via ingestion of infectious egg by anus to mouth transfer by finger (Lohiya *et al.*, 2000). However the transfer can also occur by touching contaminated surfaces such as clothing, bed linen and bathroom fixtures followed by ingestion or even through inhalation or aerosolized eggs from the aforementioned surface (Saiman *et al.*, 2001) as such pin worm infections are spread among young children with the habits of nail biting or poor hygiene and infected children can easily spread the infection to other family members through the mechanisms which mention above (Song *et al.*, 2003). Adult pin worm that live in the intestines feed off of nutrients ingested by the human,

they reproduce sexually and after they mate, the male dies, then females proceed to crawl down the intestinal tract and out the anus where the female lays her eggs in the perianal skin, this may cause itching around the anus disturbed sleep, irritability and impetigo of scratched skin (Katz and Taylor, 2001).

Loss of weight sometimes nausea and vomiting rarely ectopic infections in the pelvic area or appendix and urinary tract occur (Zaharion *et al.*, 2007), (Sarmast, 2005).

Pin worm disease is treated with antiparasitic medication such as pyrantelpamoate, mebendazole or albendazole and the prescription is usually taken by everyone in the household also treated is often times repeated two weeks to make sure the disease remains gone, nitroloxanide was very well for treatment of parasite infection (Diaz *et al.*, 2003). The present deals to clarify the impact of enterobiasis on some physical and hematological indices among children in Babylon governorate.

## **Materials and Methods**

A total of 56 children who were infested by Enterobiasis with an equal number of apparently healthy children were enrolled in a case control study in Babylon province. Data compiled for each participant included demographic information (age and sex) the samples of stool examined by direct examination coprological examination was performed by using direct microscopic examination (Urquhart *et al.*, 2001). A small amount of fecal sample was mixed with saline solution (0.9%) in a petri dish. Few drops of it were placed on glass slide, covered with cover glass. Helminth's eggs were

observed under (10x10 and 10x40) microscope. Eggs were identified on the basis of morphology (Yamaguti, 1975). It was observed that stool was infested with thread like worms could be seen with naked eye, identified as *E. vermicularis* along with number of eggs (Soulsby, 1982). The weight was measured by using a standardized weighting scale and then applied on the growth chart for measuring weight for age centile. PCV, Hb and differential WBC count were estimated to all participants following the procedure of (Dacie *et al.*, 2002).

**Statistical analysis**

Statistical analysis was done using SPSS program version 17 for windows 7 with statistical significance (p) value of <0.05. The participants included in this work were chosen by Simple Random Sampling Method. The results were analyzed using “Independent Samples t-test” and the “X2-test”.

**Results and Discussion**

**The Age**

The overall mean age of the participants was (5.2447 ± 2.89 years). There was no statistical difference between the mean of age of the patients (5.58± 2.76 years) and controls (4.9± 2.9 years) (t=12.26, df= 55). About (51.8%) of affected children were preschool as shown in table (1). This difference may be due to the fact that the small children engage more in frequent hand to mouth activity that facilitates infection transition. It was in contrast to the study of (Mauloodet *al.*, 1995) who showed that the infection rate

was greater in school children (11.6%), in comparison to smaller ones; (Kim *et al.*, 2003) showed that the infection rate in school children was 19.9% while in Kindergartens was 13.6%.

**Table.1** Age distribution of children affected by Enterobiasis

Age group(years)	Frequency	Percent(%)
<6	29	51.8
6-13	27	48.2
Total	56	100.0

**The sex**

The majority of cases (69.6%) were females as shown in figure (1) and table (2)

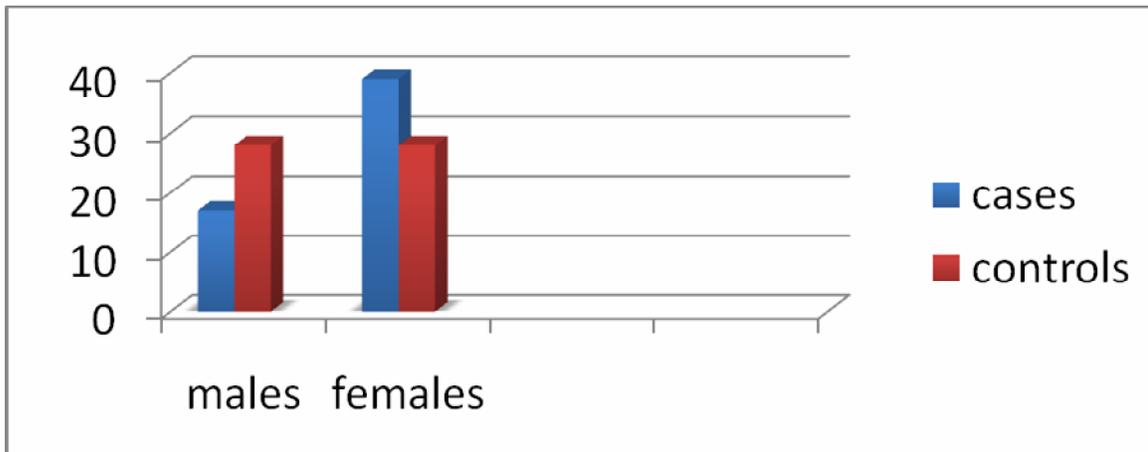
**Table.2** Sex distribution of the cases

Sex	Frequency	Percent
Male	17	30.4
Female	39	69.6
Total	56	100.0

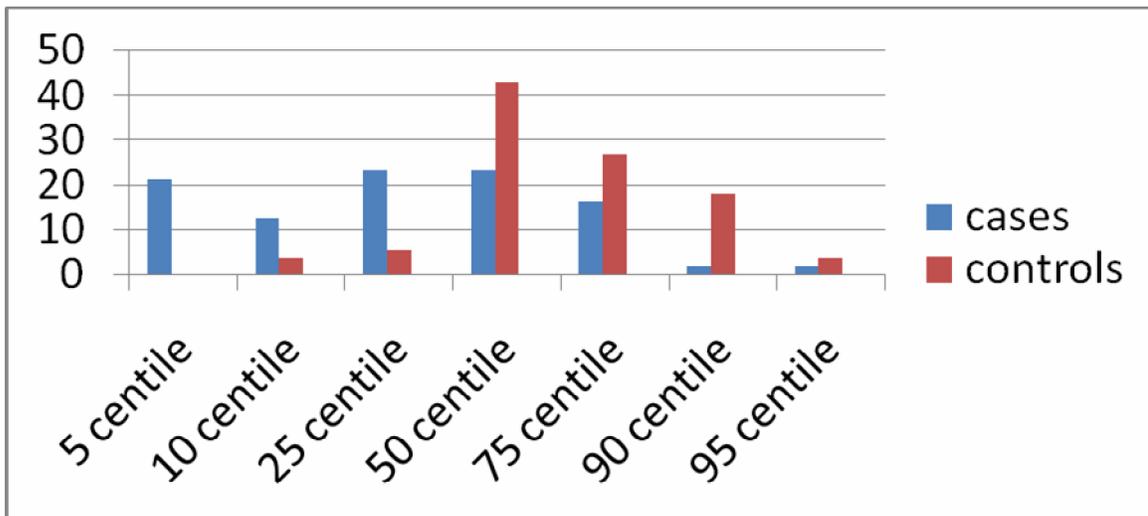
The high rate of infection between the female is likely to be connected with their daily housework, contact with bed sheet and cloth for infected person(s) of family.

This agrees with the study is in agreement with (Lee *et al.*, 1999) obtained a total rate 35.3% (38.7% of female and 31% of males) and (Kim *et al.*, 2003) who obtained a total rate 12.65% (12.7% of female and 12.6% of males). but in contrast to the study of ( Mohammad A., 2011).

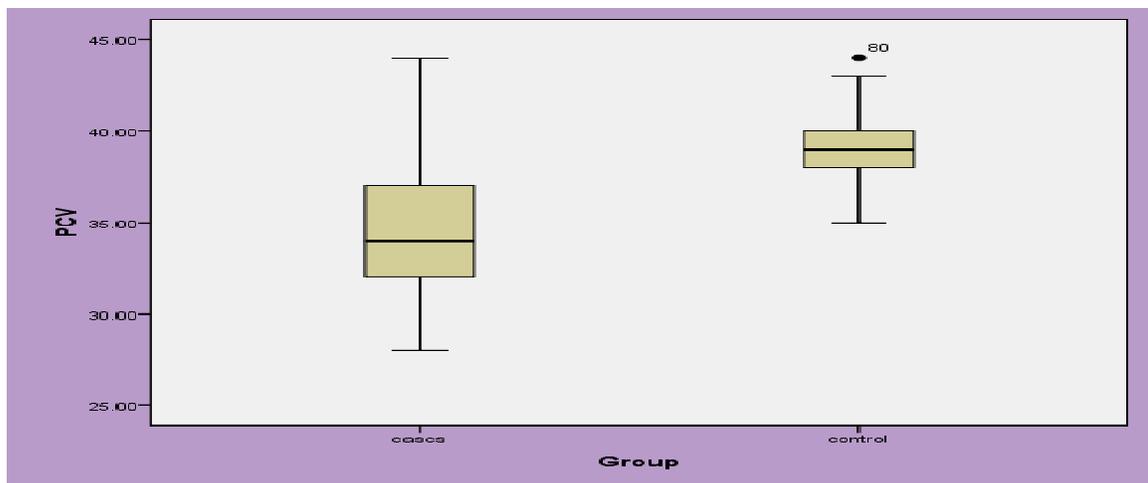
**Figure.1** Sex distribution of cases and controls



**Figure.2** Distribution of cases and controls on growth chart



**Figure.3** Difference in means of PCV of cases & Control



### **The weight for age**

There was a significant difference in the growth parameters between the cases and controls ( $p < 0.001$ ); more than 80% of the cases were below 50 centile on the growth chart as shown in figure (2).

This result was in agreement with the study of (Kadhim, 2007) who found a significant relation between enterobiasis and both weight and height deficiency of children, and study of (Ali Çeliksözet *al.*, 2010) who stated that weight for age and height for age were found to be lower in the infected children than the non infected group ( $t: 9.07$   $p < 0.05$ ,  $t: 10.95$   $p < 0.05$  respectively).

The study also shows a significant effect of increased duration of disease on weight for age parameter ( $p < 0.05$ ).

This may be due to the effect of the parasite on the integrity of the gut due to the irritation of the mucosal lining leading to malabsorption, decreased appetite, dyspepsia, abdominal discomfort (Nicki *et al.*, 2010)

### **Hematological indices of cases and controls**

#### **Packed Cell Volume and Hemoglobin Concentration**

There was a significant decreasing in the mean of PCV of the cases ( $34.35 \pm 3.62$ ) when compared with control group ( $39.41 \pm 2.17$ ) ( $p < 0.001$ ), also the mean of Hb for cases ( $11.08 \pm 1.21$ ) was significantly decreased when compared with that of the controls ( $12.83 \pm 0.74$ ) as shown in figure (3). Hemoglobin concentration was affected by enterobiasis, this result was in agreement with studies in

Diyala (Kadhim, 2007), Kalar (Mohammad and Omer, 2011) and in Erbil (Hama, 2007) who found there was a significant relation between enterobiasis and hemoglobin deficiency.

Also the study shows a significant relationship between increased duration of infestation and lowered hematocrit ( $p < 0.001$ ). This result may be due iron deficiency in the lumen of the gut and impaired the synthesis of hemoglobin and subsequently the synthesis of red blood cells. It had been found that the adult parasites produced hemolysin that could consume the RBCs and lead to anemia and reduced levels of hemoglobin and PCV.

#### **Differential White Blood Cell Count**

The study reveals a significant correlation in the white blood cells count and presence of enterobiasis, 45 (80%) of the affected children have eosinophilia, this is associated with parasitic infection. The immune response to parasitic worm infections is predominantly Th2, consistent with the presence of IL-5, important in promoting recruitment of eosinophils that play a key role in the elimination of parasites. (Levinson, 2010).

#### **References**

- Ali Çeliksözet *al.*, Effects of Enterobiasis on primary school children. African Journal of Microbiology Research Vol. 4 8, pp. 634-639, 18 April, 2010.
- Avolio L, Avoltini V, Ceffa F, Bragheri R. Perianal granuloma caused by *Enterobius vermicularis*: report of a new observation and review of the literature. J Pediatr. 1998;132: 1055-1056. [PubMed]
- Bahader SM, Ali GS, Shaalan AH, Khalil HM, Khalil NM. Effects of *Enterobius*

- vermicularis infection on intelligence quotient IQ and anthropometric measurements of Egyptian rural children. *J Egypt Soc Parasitol.* 1995; 25: 183-194.
- Burkhart, G. 2005. Assessment of the frequency transmission and genitourinary complication of Enterobiasis. *Intest J .Derm.* 44:837-840.
- Dacie and Lewis, S.M. Lewis ,B.J. Bain, I. Bates. Practical haematology ninth edition , 2002.
- Diaz, E; Mondragon ,J; Ramirerz, E. and Bernal, R 2003. Epidemiology and control of intestinal parasites with nitazoxanide in Am.J. Trop. Med. Hyg. 68 4: 384-385 .children in mexico.
- Finn L. Threadworm infections. *Community Nurse.* 1996. 2: 39.
- Grencis RK, Cooper ES. Enterobius, trichuris, capillaria, and hookworm including ancylostomacanthum. *Gastroenterol Clin North Am.* 1996; 25: 579-597.
- Gülnaz Ç and Nizami D. The relationship between Enterobiusvermicularis infection and nocturnal enuresis, Turkey. *Eur J Gen Med.*, 2006, 31:16-20.
- Hama A.A .Intestinal parasites in relation to malnutrition among primary school children in Erbil province with evaluation of some anti-parasitic drugs. M.Sc Thesis, College of Science. Salahadin Univ. Erbil., 2007, P76.
- Kadhim J.O. Epidemiological study of Enterobiasis among pupils of some primary school of Baquba District/Diyala. M.Sc Thesis, College of Education. Diyalauniv., 2007, P81. In Arabic.
- Kang, S; Jeon, H. K; and Parl, J. K. 2006. Egg positive rate of Enterobiusvermicularis among preschool children in Cheongju, Chungcheongbuk Korea. *Korean J. Parasit.* 44. 247-249
- Katz, D. E. and Taylor, D. N. 2001. Parasitic infection of the gastro intestinal tract. *Gastro. Clin Am.* 30 :795-815.
- Kim B.J, Lee B.Y, Chung H.K, L Y S, Lee K.H, Chung H.J and Ock M.S. Egg positive rate of Enterobiusvermicularis of primary school children in Geoge Island. *Korean J Parasitol*, 2003, 41:75-77.
- Lee D.S, Chung B.H, Lee N.S, Nam H.W and Kim J.H .A survey of helminthic infection in the resident of rural areas near Ulaanbaatar, Mongolia. *Korean J Parasitol.*, 1999, 37:145-147.
- Levinson, W. 2010. Review of medical; microbiology and immunology, 11<sup>th</sup> Edition.
- Lohiya, G. S; Figueroa, L. T; Crinella, F. M. and Lohiya. S. 2000. Epidemiology and control of Enterobiasis in a development Center. *West J .Med.* 172:305-308.
- Maulood N.A, Hilal M.A and Amir A.Y. Prevalence of intestinal parasites among people of Diyala province. *IbnHaitham J Science*, 1995, 92:1-18.
- Mohammad A.K, and Omer M.A, Prevalence of enterobiasis Enterobiusvermicularis and its Impact on Children in Kalar Town/Sulaimania- Iraq . *Tikrit Medical Journal* 2011; 17: 67-77.
- Nicki R. Colledge ; Brian R. Walker, and Stuart H. Ralston 2010. Davidson's principles and practice of medicine 21<sup>th</sup> edition.
- Saiman, L; Aaronson, J; Gomez-duarte, C; Gabrie P.S; Alonso, m; Maloney, S. and Schutte, J. 2001. Prevalence of

- infectious disease among internationally adopted children. *Pediatrics*. 108:608-612.
- Sarmast, M. H; Maraghi, S; elahi, A. and Mostafi, NE. 2005. Appendicitis and *Enterobius Vermicularis*. *Pak. J. Med .Sci*. 212:202-205.
- Song, H.J.; Cho, C.H; Kim, J.S. and Hong, S.T.2003. Prevalence and risk factor for Enterobiasis among preschool children in a metropolitan city in korea. *Parasit. Res*. 91:46-50.
- Soulsby, E.J.L., 1982. *Helminths arthropods and protozoa of domesticated animals*. baillieretindall, london, pp. 809.
- Urquhart, G.M., ARMOUR, J., DUNCAN, J.L., DUNN, A.M. AND JENNINGS, F.W., 2001. *Veterinary Parasitology*, ed. ELBS Langman, U.K.
- Yamaguti, S. 1975. A Synoptical review of life histories of digenetic trematode of vertebrates with special reference to the morphology of their larvae. *Keigaku. Publ. Co., Tokyo*. Pp. 410-413.
- Zaharion, A., Karamouyi, M. and Papaioannou, P.2007. *Enterobius vermicularis* in the male urinary tract: a case report .*J. Med. Case Report*. 11:137-144.