Int. j. adv. multidisc. res. stud. 2023; 3(6):1529-1533

Received: 08-11-2023
Accepted: 18-12-2023

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

The Difference between Treatments of Common Worm Infestation Associated Anemia in Iraqi Children

[1] Abbas Zaki Mahdi, [2] Jawad Hameed Hasan, [3] Mohammad Ali Kareem, [4] Fatma Abd Alhamza Obed

[1, 2, 3] Ministry of Health, Medical City, Baghdad, Iraq

[4] National Center of Hematology, Mustansiriyah University, Iraq

Corresponding Author: **Fatma Abd Alhamza Obed**

Abstract

Background:

The helminthic parasite Enterobius vermicularis causes enterobiasis, and ascaris an infection of the digestive tract, that more common in children than in adults. The current study aims to investigate the prevalence of both infection among children in Baghdad City with different treatment trial that improve Hb &Choosing which treatment is best.

Material & Methods:

A cross-sectional, statistical study involved the participation of 56 youngsters, ranging in age from six to twelve years. The participants underwent the collection of their cellophane tape samples, stool examinations, and blood samples. The blood samples were subjected to analysis using an auto-analyzer, while microscopy techniques were employed to study the cellophane tape and feces samples.

The study involved the categorization of children afflicted with worm infestation into three distinct groups in order to evaluate and choose the most effective treatment option.

Results:

Overall, 21.2 percent of people were infected with E. vermicularis; 1.4 with ascaris this percentage was somewhat (P = 0.371) higher among females (17percent) than males (14.2%) and 1.4% ascaris infection. Infected children had considerably lower mean blood Hb.no significant change in Hb level in first 2 groups, but the correlations between improvement of anemia prevalence in third group after the MMS + Deworming trial were both statistically significant (p 0.001).

Conclusion:

No significant difference in Hb level by treatment with albendazol, iron and folic acid. While treatment with MMS+ Abendazol give better results.

Keywords: Baghdad City, Hemoglobin, Enterobiasis, Ascariasis, Albendazol, Multiple Micronutrient Supplement

Background

Many types of nematode worms that can spread disease to people once they come into contact with contaminated soil OR or in direct contact. Roundworms (Ascaris lumbricoides) are the most common causative parasites of Soil Transmitted Helminthes infections that generally affects children [1]. While Pinworms (Enterobius vermicularis) are the common directly transmitted worm that lives in the human intestines and spreads mostly through close personal contact [2] especially prevalent in big households and institutional settings like boarding schools, nursing facilities, and orphanages. This type of transmission, which typically takes place indoors, can be classified as contaminative because the eggs are infectious right away. This is in contrast to soil-transmitted geohelminthes, in which the egg or larvae continue developing in the soil [3].

Ascaris lumbricoides, Trichuris trichiura, the hookworms, and Strongyloides stercoralis are examples of soil-transmitted roundworms that commonly infest the intestines. Stoll's, study speculated that these worms, along with Enterobius vermicularis, were responsible for over 75% of all helminthic infections [4].

Children in slums, where there is poor sanitation, a high population density, low levels of education, and a lack of health facilities, are disproportionately affected by STH infections. Mainly a kids between the ages of 5 and 15 [5]. Children's nutritional status, academic performance, and brain development can all be negatively impacted by worm infections. It is believed that the presence of those effects is mediated by iron status.

Anemia from parasites like hookworms, whipworms and pinworms causes people to be less active and less productive on the job. In addition, can lead to deficits in micronutrients such folic acid [5, 6].

Afkar *et al* (2005) found that the prevalence of helminthiasis among school children in the resafa district of baghdad city, Iraq,

was 16.8%, about seasonal variation of helminthes infection, the summer season recorded the highest percentage of 26.2%, followed by the spring season with a rate of 13.6%, and the lowest in the autumn season with a different rate of 7.9%. [7] Another study in Mosul city revealed that 14.1% of school children infested soil transmitted worm and commonly with (Enterobius vermicularis)3.4% and ascaris 0.49.in 2001 [8].

Materials & Methods

From November 2022 through the end of August 2023, a cross-sectional survey was conducted in school students of southwest Baghdad City. The study included students of seven schools from AL Aalam Health care district and seven school from AL Doora Health care district. There were a total of 340 kids (140 boys and 200 girls) between the ages of 6 and 12 that took part in this study. In order to accurately gauge the true prevalence of the infection, sampling regions were selected that included children from a wide range of socioeconomic backgrounds. Each mother was interviewed and asked to fill out a particular simple questionnaire form for her child's participation in the study to collect primary data. children should not take any anthelmintic drugs for the last months at least and tonics for the last three months.

Cellophane tape sample collection and examination for enterobius

Children's samples for pinworm were taken by pushing the sticky side of the tape against their anal and perianal areas multiple times before adhering it to a labelled glass slide and sealing it in a sterile, clean nylon envelope. This was done at night or first thing in the morning before the kids defecated, used the restroom, or showered [9]. The gathered samples were taken to the central public health Laboratory /microbiology department where they were inspected under a light microscope (magnification: 1000x).

The findings of other helminthic infection in this study depend on the use of direct and floatation techniques in concentrated brine solution and zinc sulphate solution [10] 54 infected (enterobiasis-positive group) and 2 infected (Ascaris lumbricoids group) children that Only The cases infected with common worms were selected because the research discusses the preference of different treatments for anaemia associated with infection by common intestinal worms in Iraq.

- The Hb levels of the children who tested positive for helminthiasis were tested by drawing blood from the participants via vein puncture and placing the blood samples in EDTA tubes [11]. The child with Hb level 11gm/dl or less, considered anaemic [12]. We used the HemoCue Hb 301 to check our haemoglobin levels [13].

The children revealed positive test for infection were split into three groups. Albendazole 400 mg was given to one group (**No. 1)** as a single dosage for enterobiasis and weekly for ascaris [14], while iron 30 mg and folic acid 250 g were given to the other group (**No. 2**) with albendazol 400 mg on a weekly basis for three months. The third group given MMS (multiple micronutrient supplementation) 3 days weekly (at least) with albendazol 400 mg, for three months. We rechecked Hb levels and faeces three months later. [MMS contained several vitamins and minerals to meet the nutritional needs of the growing child and other metabolic processes]

Data analysis:

SPSS version 22 was used to analyze the data, and a 95% CI and a significance level of p 0.05 were applied for the analysis. Evidence from both.

Research ethical consideration:

Mustansiriyah University's College of Sciences Research Ethics Committee approved the study. Children who participated in the study have their parents' written agreement and the foundation's director's written approval.

Parents were educated on the need of participating in the study and receiving their children's samples for analysis. The outcomes of the examinations were also shared with them. Parents were assured that their children's participation in the study would be kept confidential.

Results

340 elementary school students from grades one through six participated in this study, and their feces were tested directly together with adhesive tape. 56 kids met the inclusion/exclusion criteria and were included in the study. Females were more likely to be infected than males were; the female infection rate was 17% (34/200) whereas the male rate was just 15.7% (22/140). There was no statistically significant difference in the prevalence of both worm type across sexes (P > 0.064) as show in Table 1.

Table 1: Prevalence of enterobius vermecularis and ascaris

Gender	Enterobiasis No.	Ascariasis No
Male	20 (14.2%)	2 (1.4)
Female	34 (17%)	0
Total No	54(21.2%)	2(1.4%)

Prevalence of Enterobius vermicularis among children in relation to sex.

*P-value = 0.064 (NS)

- Students with worm infestations were split into three groups for this study. Twenty children in the first group received a single dosage of albendazole 400 mg tablets for one week for enterobius and weekly for ascaris, whereas the same number in the second group received albendazole tablets once along with iron 30 mg and folic acid 250 g weekly for three months. The third group of 16 children received the same deworming treatment plus multiple micronutrient supplement for at least 3 days weekly for three months. Detailed in Table 2.
- Albendazole is available in a variety of oral liquid and pill formulations. Albendazole is not easily absorbed by the body, which makes dosing a challenge. For this reason, [6] it is recommended that albendazole be used after a fatty meal. Albendazole exhibits limited solubility in aqueous solutions, although it demonstrates enhanced bioavailability when co-administered with a meal high in fat content. The compound undergoes swift initial hepatic metabolism, resulting in the formation of albendazole sulfoxide, a metabolite that exhibits highly effective anthelmintic properties. But usually Albendazole, when used to treat an intraluminal disease, is most effective when administered on an empty stomach [15]. Due to the potential for pancytopenia and anemia, a complete blood count (CBC) with differential should be conducted after 28-day of treatment and every two weeks during therapy [16, 17].

Table 2: Subject characteristic data with different treatment trial groups distribution

Group	Number of children	Male	Female	Age (mean± SD) years	Type of treatment	Time of treatment
1	19	8	11	8.92 ± 1.19	Albendazol 400 mg	*Single dose repeated 2 weeks later
2	20	7	13	9.0 ± 2.8	Albendazol 400mg + iron 30mg + folic acid 250µg	*Single dose repeated 2 weeks later & tonics Weekly for 3 months
3	17	7	10	9.4 ± 1.2	Albendazol 400mg + MMS	*Single dose repeated 2 weeks later & **MMS Daily for 3 days or more weekly

* Single dose of albendazol for enterobiais and weekly dose for ascaris infection
**MMS (multiple micronutrient supplementation)

Table 3: Hb level in research groups

Groups	Hb levels before treatment, *Median (range)*	Hb levels after treatment, *Median (range)*	Change in Hb average, *Median (range)*	*P*
G1	12.4 *(10.5-13.2)*	12.4 *(11.0-13.8)*	0.5(-4-2.2)	0.04
G2	12.2 *(9.6-14.6)*	12.6 *(12.0-14.2)*	0.3(-1.3 -3.3)	0.003
G3	11.8 *(9.5-15.0)*	13.5 *(11.0-15.4)*	1.5(0.4-4.2)	0.001

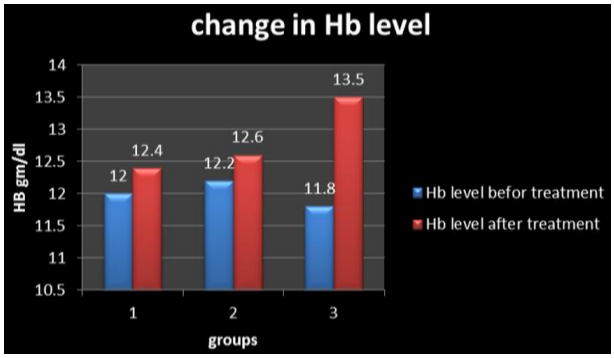

Fig 1: Median Hb level tested before and after treatment trials

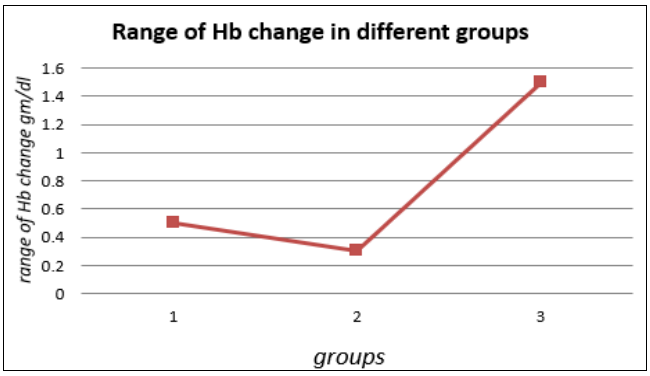

Fig 2: Range of increase in Hb level in different group after treatment

Discusion

Intestinal worm infection is considered one of the most common health problems in Iraq and middle east country that require continuous follow up and screening, with its associated financial costs and occupying most of the primary medical services departments of maternal and child health care also most child be carriers with no symptoms, which can be more dangerous and cause more public health problems [18]. In this study done in southwest Baghdad health care district that students between 6-12 years age from 14 primary schools participated in this study, after excluding of cases that are not suitable for the research requirements, only 56 children from 340 revealed positive tape test and stool examination for enterobius vermicularis(21.2%)& ascaris(1.4) infection only, which as we know a Numerous international and domestic epidemiological investigations demonstrate that intestinal parasite prevalence and epidemiological aspects vary not only between regions but also between countries itself [19]. These variations may result from host- and environment-specific variables that influence the spread of helminthes infections [20]. In the current study, the risk of E. vermicularis infection was higher in female but not significantly different between male and female children as in table 1, when utilizing the adhesive tape method to determine infection status. Children's poor hygiene was the main factor in explaining why there were more cases of enterobiasis in girls than boys [21]. These results corroborate those of studies reporting a higher prevalence of this helminth in female children in Mosul City and in the Al-Mahmoudyia area of Baghdad [22, 23]. In contrast, studies reporting a higher prevalence in male children have been conducted in Basrah, Iraq and Egypt's Damietta governorate [24, 25]. Also, we see in table 1 lower prevalence of infection than that revealed in study of children among 2-12 years in Baghdad, and that of same age in turkey [26, 27] while higher prevalence than that study in Iran (Mazandaran) [28]. Although the socioeconomic conditions in Iraq are currently better than in Iran, the study shows a wider spread in Iraq, perhaps because the research area is located in areas of a lower socioeconomic nature than the rest of Baghdad city.

In this study, there were no statistically significant differences between the groups that received albendazole as a single dosage and the group that received albendazole with iron-folic acid supplementation in terms of the increase in Hb level. Fig 2.

However, a study conducted by Bhoite and Iyer (2012) demonstrated that supplementing students with iron and folic acid as part of a deworming program effectively increased hemoglobin levels [29]. The small number of anemic participants, mild nature of enterobiasis and little number of ascaris infection made these distinctions possible.

Overall, the results of the study showed that interventions involving both MMS and deworming medications would have a positive effect on lowering the prevalence of anemia among children between the age of six to twelve years in Baghdad, although Iraq considered middle economic income country, that indicate the independent effect of deworming and iron, folic acid supplement on Hb level but The efficiency of the intervention and the prevalence of anemia could be greatly improved by combining anthelminthic with numerous micronutrients, including iron that Children with worm infestation had lower food intake and lower appetites, which contributed to stunted development, poor health, impaired cognitive abilities, and even starvation According

to Ahmed *et al*. (2012) and Cabada *et al*. (2015), [30, 31]. As seen in Fig 1 and Table 3.

Conclusion

Pupils of primary schools in Baghdad city, Iraq. Who had enterobius and ascaris infestation while using albendazole showed no improvement in Hb level while taking iron-folic acid supplements. Albendazole increases hemoglobin levels with or without iron and folic acid treatment. Supplementation with iron-folic acid in children with infections warrants more study with a bigger sample size, also this study the relevance of employing integrated and multidisciplinary intervention strategies was underscored by the combined impact of anthelminthic and multiple micronutrient supplements on the reduction in anemia prevalence. The high prevalence of anemia in young children, especially in low-income settings, is likely to be addressed by the integration of nutrition-specific and health-related interventions.

Acknowledgements

We would like to thank all health workers in laboratory of Baghdad city hospital. Those who provided assistance and advice as well during the collection and examination of samples during the research period.

- The costs of conducting the research and the funding depended on the researchers without any financial participation from another source.
- We have no known Conflict of interest to disclose.

Ethics approval

This study was conducted in accordance with the declaration of Helsinki obtained from ethics committee of College of Science, Mustansiriyah University, the collection and evaluation of all protected patients health information was performed in a health insurance portability and accountability act-compliant manner.

-Informed consent was obtained prior to performing procedure including permission for publication of all information related to the study. According to the Declaration of Helsinki.

References

1. Ozyalvacli G, Kucukbayrak A, Uzuner E, Ayaz E, Oznur M. Ascarislumbricoides presenting as an omental mass. Acta. Medica. Mediterranea. 2014; 30:1393.
2. Kang S, Jeon HK, Eom KS, Parl JK. Egg positive rate of Enterobius vermicularis among preschool children in Cheongju, Chungcheongbul-do, Korea, Korean J. Parasitol. 2006; 44(3):247-249.
3. Brooker S, Miguel EA, Moulin S, Luoba AI, Bundy DAP, Kremer M. Epidemiology of single and multiple species of helminthes infections amongschool children in busia district, Kenya. East Afr Med J. 2000; 77(3).
4. Chan MS, Medley GF, Jamison D, Bundy DAP. The evaluation of potential global morbidity attributable to intestinal nematode infections. Parasitology. 1994; 109:373. [PubMed]
5. Robinson DC, Maayan N, Weiser KS, Donegan S, Garner P. Deworming drugs for soil-transmitted intestinal worms in children: Effects on nutritional indicators, haemoglobin, and school performance. Cochrane Database. Syst Rev. 2015; 7:CD000371. Doi: https://doi.org/10.1002/14651858. CD000371 PMid:26202783
6. Crompton DW, Nesheim MC. Nutritional impact of intestinal helminthiasis during the human life cycle. Annu Rev Nutr. 2002; 22:35-59. Doi: https://doi.org/10.1146/annurev. nutr.22.120501.134539
7. Yakoob AY, Hadi AM. Prevalence of Hymenolepis nana in children in Baghdad-Al-Resafa, Iraqi Journal of Veterinary Medicine. 2009; 33:2.
8. Al Ebadie AA, Abdallah AA. Al-Rafidain Science Journal, Special to Life Sciences, 16(8):258-264.
9. Değerli S, Malatyali E, Özçelik S, Çeliksöz A. Enterobiosis in Sivas, Turkey from past to present, effects on primary school children and potential risk factors. Türkiye Parazitol Derg. 2009; 33(1):95-100. [PubMed] [Google Scholar]
10. Garcia LS, Bruckner DA. Diagnostic Medical Parasitology. 2nd ed. Washington. D.C, 1993, 764.
11. WHO. Manual of Basic Techniques for a health Laboratory 2ed edition, Geneva, 2003, p398.
12. Nutritional Anemia. Report of a WHO Scientific Group. Gerona, World Health Organization, 1968; 18. 2016; 1:CD007745. [PMC free article] [PubMed] [Reference list]
13. Olivares JL, Ferna'ndez R, Fleta J, Ruiz MY, Clavel A. Vitamin B12 and folic acid in children with intestinal parasitic infection. J Am Coll Nutr. 2002; 21(2):109-113. Doi**:** 10.1080/07315724.2002.10719202. [Pub Med] [CrossRef] [Google Scholar]
14. Henriquez-Camacho C, Gotuzzo E, Echevarria J, White AC, Terashima A, Samalvides F, *et al*. Ivermectin versus albendazole or thiabendazole for Strongyloides stercoralis infection. Cochrane Database Syst Rev, 2016.
15. Zhang H, Liu C, Zheng Q. Development and application of anthelminthic drugs in China. Acta Trop. 2019; 200:105181. [PubMed]
16. Xing F, Ye H, Yang J, Chan JF, Seto WK, Pai PM, *et al*. Fatal pancytopenia due to albendazole treatment for strongyloidiasis. IDCases. 2018; 12:112-116. [PMC free article] [PubMed]
17. Choi JS, Han JY, Ahn HK, Ryu HM, Koren G. Foetal outcomes after exposure to albendazole in early pregnancy. J Obstet Gynaecol. 2017 Nov; 37(8):1108-1111. [PubMed]
18. Al-Daoody AA. Prevalence of Enterobius vermicularis infection among children of Al-Nusoor kindergarten in Mosul city and the effect of some disinfectants on its eggs viability. Rafidain J Sci. 2005; 16(6):188-201. [Google Scholar] [Ref list]
19. Hussein RA, Shaker MJ, Majeed AA. Prevalence of Intestinal Parasitic Infections among Children in Baghdad City. Iraq Academic Scientific Journal, 2011.
20. Shumbej T, Belay T, Mekonnen Z, Tefera T, Zemene E. STH. Helminths and Associated Factors among Pre-School Children in Butajira Town, South-Central Ethiopia: A Community-Based Cross-Sectional Study. PLoS One. 2015: 10(8):e0136342.
21. Martila M, Sandy S, Paembonan N. The relationship between personal hygiene and worm infections among students at Abe Pantai Jayapura public elementary school. J Plasma. 2015; 1(2):87-96. Doi: https://doi.org/10.22435/plasma. v1i2.4538.87-96.

22. Al-Daoody AA. Prevalence of Enterobius vermicularis infection among children of Al-Nusoor kindergarten in Mosul city and the effect of some disinfectants on its eggs viability. Rafidain J Sci. 2005; 16(6):188-201. [Google Scholar]
23. Hammadi KA. Study for intestinal parasites among children in AL-mahmoudyia area/ Baghdad province. Bio J Kufa Uni. 2012; 4(1):271-274. [Google Scholar]
24. Mustafa FA. Infection of Enterobius vermicularis and its relationship with psychological and behavioural patterns among children, a diagnostic study on Basrah's governorate children. Wassit J Sci Med. 2009; 2(2):8-23. [Google Scholar]
25. Mohammad KA, Mohammad AA, Abu El-Nour MF, Saad MY, Timsah AG. The prevalence and associated risk factors of intestinal parasitic infections among school children living in rural and urban communities in Damietta governorate, Egypt. Academia Arena. 2012; 4(5):90-97. [Google Scholar]
26. BN AL-Q, HS AL-W. Anemia and Enterobiasis among Iraqi children. J Coll B Education. 2012; 76(1):57-62. [Google Scholar]
27. Keskin N, Bektas A. The prevalence of Enterobius vermicularis in primary school which have different socioecomic level in Ankara. Turkiye Parazitol Derg. 2014; 38(3):159-165. Doi: 10.5152/tpd.2014.3557. [PubMed] [CrossRef] [Google Scholar]
28. Afrakhteh N, Marhaba Z, Mahdavi SA, Garoosian S, Mirnezhad R, Vakili ME, *et al*. Prevalence of Enterobius vermicularis amongst kindergartens and preschool children in Mazandaran province, North of Iran. J Parasitic Dis, 2015. Doi: 10.1007/s12639-015-0683-z Available at: http://link.springer.com/article/10.1007% 2Fs12639–015-0683-z#page-1. [PMC free article] [PubMed]
29. Bhoite RM, Iyer UM. Effect of deworming vs iron-folic acid supplementation plus deworming on growth, hemoglobin level, and physical work capacity of school children. Indian Pediatr. 2012; 49(8):659-661. Doi: https://doi.org/10.1007/s13312-012-0129-y
30. Ahmed A, Al-Mekhlafi HM, Al-Adhroey AH, Ithoi I, Abdulsalam AM, Surin J. The nutritional impacts of soiltransmitted helminths infections among orang asli school children in rural Malaysia. Parasit Vectors. 2012; 5:119. Doi: https://doi.org/10.1186/1756-3305-5-119 PMid:22704549
31. Cabada M, Goodrich MR, Graham B, Villanueva-Meyer PG, Deichsel EL, Lopez M, *et al*. Prevalence of intestinal helminths, anemia, and malnutrition in Paucartambo Peru. Pan Ame J Public Health. 2015; 37(2):69-75. PMid:25915010