



EFFICACY OF ALBENDAZOLE AGAINST *ENTEROBIASIS* IN BELOW 15 YEARS OLD CHILDREN: A CASE REPORT FROM LOWER DIR, PAKISTAN

Mashaal Abdullah Aldamigh¹, Aziz Ur Rahman^{2*}, Ata Ur Rahman³, Nasreen Khan⁴, Saleh Muhammad⁵, Eliana Ibañez-Arancibia⁶⁻⁸, Patricio De los Rios-Escalante^{8,9}

¹Department of Biology, College of Science in Zulfi, Al-Majmaah University, Al-Majmaah 11952, Saudi Arabia

^{2*}Department of Pharmacy, University of Malakand, Lower Dir, Pakistan

³Department of Botany, University of Malakand, Lower Dir, Pakistan

⁴Department of Zoology, Jinnah University for women, Karachi, Pakistan

⁵Department of Zoology, University of Malakand, Lower Dir Pakistan

⁶PhD Program in Sciences mentioning Applied Molecular and Cell Biology, La Frontera University, Temuco, Chile

⁷Laboratory of Engineering, Biotechnology and Applied Biochemistry – LIBBA, Department of Chemical Engineering, Faculty of Engineering and Science, La Frontera University, Temuco, Chile

⁸Department of Biological and Chemical Sciences, Faculty of Natural Resources, Catholic University of Temuco, Temuco, Chile.

⁹Nucleus of Environmental Sciences, Faculty of Natural Resources, Catholic University of Temuco, Temuco, Chile

***Corresponding Author:** Aziz Ur Rahman

^{*}Department of Pharmacy, University of Malakand, Lower Dir, Pakistan, Email: aziz@gmail.com

Abstract

Enterobius vermicularis (the human pinworm) causes enterobiasis in humans. Almost 209 million people have found to be infected with pinworm globally. It is considered to be the most popular helminthic infection. The aim of this study was to diagnose and establish appropriate effective trial for treatment of human enterobiasis. The infection was diagnosed for detecting EPG by examining the faecal material of the infected person before and after treatment. Two stool samples were collected from each student before and after diagnosing. The samples were fixed in 10% formalin and tested by light microscopy using the methods of direct smear in Lugol's solution, normal saline solution and flotation techniques. A total of 184 faecal samples were collected from students' age 6-15 years, found 82% (n=151/184) parasitic infection. Albendazole was used for the treatment which show 82.42% efficacy against enterobiasis in the present study.

Key words: Entrobiasis, EPG, Albendazole.

Introduction

Entrobiasis or oxyuriasis is caused by *Enterobius vermicularis* (the pinworm of humans) the nematode parasite infecting children. A total of 209 million people have found infected with this pinworm around the world (Efraimidou et al. 2008). Entrobiasis is characterized by anal itching, abdominal pain, teeth grinding, nausea and vomiting in child (Youssefi 2012). According to Chung et al 1997

pinworm causes weight loss urinary tract infection mental distraction and vaginal inflammation. The residents of developing as well as developed nation has proved to be infected (Peterson et 1994). It is estimated that more than 50% of the parasitic infected population are children, about 39 million disability adjusted life years are connected with parasitosis which is a huge financial burden (Stephenson et al 2000).

The rate of prevalence of enetrobiasis is changeable in various region of the world. It is estimated 30% in North America and Western Europe and in children it is 50-60% (Marquardt et al 2000). Study conducted by Yoon et al 2000 reveals 9.2% of the Korean population were infected by Entrobiasis. A study conducted by Maribel et al 2013 claimed 52.5% Entrobiasis in his study. Another study conducted by Chai et al 2015 resulted 47.2% *Enterobius vermicularis*. A study conducted from Thailand by Nithikathkul et al in 2001 reported 38.7% Entrobiasis. Another study conducted by Culha and Duran 2006 from Turkey reveals 33.8% Entrobiasis. Study conducted from Karachi, Pakistan by Memon et al 2014 estimate 48.5% Entrobiasis.

In current study the prevalence of *Enterobius vermacularis* is 0.33% which is comparable with the study reported from Iran by Sayyari et al in 2005. Albendazole, mebendazole and Benzimidazoles are recommended as anthelmintic drugs (Albonico et al 1999) and WHO 2010. In the current study Albendazole was used orally which show 82.42% egg reduction rate. Intestinal parasitic infection were have been published in the study area such as (Khan et al., 2011; Noor un Nisa et al., 2012; Khan et al., 2014; Khan et al., 2015; Khan et al., 2016; Khan et al., 2017a;b; Khan et al., 2018a;b;c;d; Khan et al., 2019a;b; Arshad et al., 2019; Khan et al., 2020; Khan et al. 2021a;b; Rahman et al., 2021; Ulhaq et al., 2021; Iqbal et al., 2021; Garedaghi et al., 2021; Khan et al., 2022, Rahman et al., 2022; Subhan et al., 2023; Khan et al., 2023) have been published on the prevalence of intestinal parasitic infections among various groups of human population but no such work was found on enterobiasis, Current study was aimed to investigate the infection caused by E.vermicularis offered with clinical and risk factors determined.

Case study

A 15 years old boy (student 68kg weight, 154.9cm height) presented with no pain in abdomen. The student was characterized by having 20.32cm upper arm circumference, 83.82cm lumber width, risk factors were identified. His clinical examination and findings were normal. He was taking no medications. The laboratory report was demonstrated with evidence of *Enterobius vermicularis* eggs. The infectee was given albendazole 200mg for 3 days, and then a single stool sample was re-collected and diagnosed for the presence of eggs in stool. The family members of the patients were become aware and treated for enterobiasis and other close contacts shall be informed. Mebendazole were prescribed for the affected and for all the family members of the patient. The physician was recommended a single dose of 100 mg for the patient for second treatment after 15 days.



Figure 1. Egg of *Enterobius vermicularis* in plano-convex view

Scotch Tape Test is the most common technique for enterobiasis diagnosing which is used against the perianal skin early in the morning and the eggs becomes attached and examined under the microscope. Inspecting the stool for enterobiasis is scarce due to less common found of worms and eggs in the stool. However in patients with severe infection or a high worm burden, the eggs or adult

parasite may be present in the stool (Leder and Weller, 2012). The infection may also cause leucocytosis or eosinophilia (Gialamas, 2012)

Discussion

Albendazole was used for the treatment of Entrobiasis and show 82.42% efficacy in the present study. Mebendazole, pyrantel pamoate and albendazole are used as drugs of choice in 100mg once, then repeated 2 weeks later. Pyrantel pamoate is most effective against worms while not usually active against ova. Albendazole is quickly spreads in tissues, and enters bile, cerebrospinal fluid uses against ova. 400mg of dose once repeatable in 2weeks for enterobiasis was recommend (Rosenthal et al. 2012). Pyrantel pamoate can be used in case of patients with liver dysfunction.

Current study provides information regarding a case of *Enterobius vermicularis* in a 15 year old boy. The case was treated with albendazole. A total of 184 stool samples were collected and examined before and after treatment, the prevalence of total parasitosis was 82% (n=151/184), in which Entrobiasis was 0.33% (n=1/184). Entrobiasis was first reported in late 19 century Still 1899. Entrobiasis mainly infect children due to lack of personal hygiene (Garcia 2001). Pinworm is one of the most important parasitic infections globally; normally infect the gut of children in tropical regions (Neva and Brown 1994). Study conducted from Muzzafarabad, Pakistan by Chudhry et al 2004 reported 13.5% entrobiasis²¹. Another study reported by Manzoor and Khan 2014 from Islamabad, Pakistan claimed 60% Entrobiasis. Another reported by Memon et al 2014 from Karachi, Pakistan quoted 48.5% Entrobiasis. Another study conducted from Karachi, Pakistan by Ahmed et al 2015 reveals 2.8% Entrobiasis. While in the current study prevalence of Entrobiasis were the lowest of all the parasitosis 0.33 % (n=1/184).

Conclusions

It is concluded that trial to control Entrobiasis should continue unlimited intervals of time and that of intensity of infection should be focused to a decrease in the egg prevalence should be taken into account. Albendazole has been considered to be the drug of choice against these parasites. Present study provide effective control of this pinworm infection even other preventive measures were silent.

Reference

1. Ahmed MU, Bilal M, Anees K, Khan AM, Fatima, K, Ahmed I, Khateri AM, Rahman, S. 2015. The frequency of *Enterobius vermicularis* infections in patients diagnosed with a acute appendicitis in Pakistan. *Global Journal of health Science*, 7(5): 196-201
2. Albonico M, Crompton DWT, Savioli L. Control strategies for human Intestinal nematode infections. *Adv Parasitol*.1999; 42: 277–341.
3. Arshad, S., Khatoon, N., Warind, J.A., Khan, A., Waheed, S. and Khan, W., 2019. The prevalence of human intestinal protozoal and helminthic infection in Karachi. *International Journal of Biology and Biotechnology*, 16(2):.319-323.
4. Chaudhry ZH, Afzal M, Malik MA. Epidemiological factors affecting prevalence of intestinal parasites in children of Muzaffarabad district. *Pakistan J Zool*. 2004; 36:267-71.
5. Chung, D.I., Kong, H.H., Yu, H.S., Kim, J. and Cho, C.R. (1997) Live Female *Enterobius vermicularis* in the Posterior Fornix of the Vagina of a Korean Woman. *Korean Journal of Parasitology*, **35**, 67-69. <http://dx.doi.org/10.3347/kjp.1997.35.1.67>
6. Efraimidou E, Gatopoulou A, Stamos C, Lirantzopoulos N, Kouklakis G. *Enterobius vermicularis* infection of the appendix as a cause of acute appendicitis in a Greek adolescent: a case report. *Cases J*.2008; 1:376.
7. Garcia LS. *Diagnostic Medical Parasitology*. 4th ed. Washington DC: ASM; 2001;274
8. Gialamas E et al. A rare Cause of Appendicitis. *Turkiye Parazitol Derg*. 2012;36: 37-40
9. Gülnaz Çulha1, Nizami Duran2 The Relationship Between *Enterobius Vermicularis* Infection And Nocturnal Enuresis *Eur J Gen Med* 2006; 3(1):16-20

10. Iqbal, M., Khan, W., Khan, M.F. and Khan, I., 2021. Albendazole and mebendazole in the treatment of ancylostomiasis in school children between the ages of 6-15 in Swat, Pakistan. JPMA. The Journal of the Pakistan Medical Association, 71(8), pp.2058-2060.
11. Jong-Yil Chai, Seung Koo Yang, Jae Won Kim¹, Soo-Lyoen Choi¹, Gyu-Young Song¹, Bong-Kwang Jung¹, Min-Jae Kim¹, Jaeun Cho¹, Deok-Gyu Kim¹, Woon-Mok Sohn², Hoo-Gn Jeoung³, Seon Cho³, Jong-Bok Park³, Sooji Hong³, Thi Thi Htoon⁴, Htay Htay Tin. 2015. **High Prevalence of *Enterobius vermicularis* Infection among Schoolchildren in Three Townships around Yangon, Myanmar** *Korean J Parasitol* Vol. 53, No. 6: 771-775
12. Khan, W., Khan, N., Khan, R., Iqbal, A., Ullah, R., Ghaffar, S.A., Mehmood, S., Ahmad, S., Khan, and F. Ullah, 2019b. Soil-transmitted helminth infections in school children of three districts of Malakand region, Khyber Pakhtunkhwa, Pakistan. Pak. J. Pharm. Sci., Vol.32, No.2 (Suppl), pp.799-803 ol. 51(2), pp 797-799, 20, 201.
13. Khan, W. and Khan, A., 2015. Diversity of intestinal parasites in male and female students and workers of Education Department of Swat, Pakistan. Pakistan Journal of Zoology, 47(2).
14. Khan, W. and Khan, A., 2017b. Soil transmitted helminthiasis in different occupational groups in Swat, Khyber Pakhtunkhwa, Pakistan. Pakistan Journal of Pharmaceutical Sciences, 30(4), pp.1345-1351
15. Khan, W. and Khan, A., 2018b. Prevalence of Potentially Important Intestinal Pathogenic Protozoan Parasitic Infections in Different Occupational Groups of Swat, Pakistan. Pakistan Journal of Zoology, 50(1).
16. Khan, W. and Nawaz, M.A., 2018d. Incidence of tapeworm infection in human population of Swat, Pakistan: an occupation based study. Pakistan Journal of Zoology, 50(2), pp.639-639.
17. Khan, W., Arshad, S., Khatoon, N., Khan, I., Ahmad, N., Kamal, M., Ul Hassan, H., Khan, N., Haq, A.U., Ilyas, M. and Ullah, S., 2021a. Food handlers: an important reservoir of protozoans and helminth parasites of public health importance. Brazilian Journal of Biology, 82.
18. Khan, W., Fadladdin, Y.A.J., Rafiq, N., Naz, R., los Rios-Escalante, D., Patricio, R., Ahmad, S., Alrobaish, S.A. and Al-Sowayan, N.S., 2023. Toxoplasmosis—Awareness and Knowledge of Pregnant Women in Rural Areas of Malakand Region, Pakistan. Journal of Parasitology Research, 2023.
19. Khan, W., Gul, S., Gul, M. and Kamal, M., 2018c. Prevalence of parasitic infestation in domestic pigeons at Malakand region, Khyber Pakhtunkhwa, Pakistan. International Journal of Biosciences, 12(4), pp.1-7.
20. Khan, W., Imran, A., Wahab, Intestinal Obstruction by *Ascaris lumbricoides* in a 12 year Old Boy: A Case Report in Pakistan. J Bacteriol Parasitol 7: 262. doi:10.4172/21559597.1000262, 201.
21. Khan, W., Iqbal, M. and Khan, I., 2019c. Albendazole in the treatment of ancylostomiasis, ascariasis, taeniasis and amoebiasis in school children. Pakistan Journal of Zoology, 51(4), p.1587.
22. Khan, W., Khan, J., Ur Rahman, A., Ullah, H., Salim, M., Iqbal, M., Khan, I., Salman, M. and Munir, B., 2018a. Albendazole in the treatment of Hymenolepiasis in school children. Pakistan Journal of Pharmaceutical Sciences, 31.
23. Khan, W., Nisa, N.U., Khan, A. and Naqvi, S.M.H.M., 2012. Endemicity of intestinal parasites with special reference to nematodes in individuals related to education (students, staff & workers) in Swat KP, Pakistan. Pak J Nematol, 30(1), pp.77-85.
24. Khan, W., NOOR-UN-NISA and KHAN, A., 2017a. Prevalence and risk factors associated with intestinal parasitic infections among food handlers of swat, Khyber Pakhtunkhwa, Pakistan. Journal of Food and Nutrition Research, 5(5), pp.331-336.
25. Khan, W., Panhwar, W.A., Mehmood, S.A., Ahmed, S., Ahmed, M.S., Khan, N., Khan, M.M., Akram, W. and Ullah, S., 2021b. Pinworm infection in school children of four districts of Malakand region, Khyber Pakhtunkhwa, Pakistan. Brazilian Journal of Biology, 82, p.e238769.

26. Khan, W., Panhwar, W.A., Mehmood, S.A., Ahmed, S., Ahmed, M.S., Khan, N., Khan, M.M., Akram, W. and Ullah, S., 2021. Pinworm infection in school children of four districts of Malakand region, Khyber Pakhtunkhwa, Pakistan. *Brazilian Journal of Biology*, 82.
27. Khan, W., Rahman, H., Rafiq, N., Kabir, M., Ahmed, M.S. and Escalante, P.D.L.R., 2022. Risk factors associated with intestinal pathogenic parasites in schoolchildren. *Saudi Journal of Biological Sciences*, 29(4), pp.2782-2786.
28. Leder K and Weller P. Enterobiasis and trichuriasis. UpToDate Online. Available at: www.uptodate.com. Accessed December 26, 2012.
29. Manzoor A and Khan F. 2014. Appendectomy in appendical parasitosis: A retrospective analysis, *Journal of surgery Pakistan*. 19(3): 100-103
30. Maribel B. Cruz, Ma. Anrache D. Antonino, Chiharu K. Manal, Karen D. Obillo, Mick Hail R. Quigao, Nichole D. Usita, DETECTION OF PINWORM (*ENTEROBIUS VERMICULARIS*) EGG AMONG CHILDREN AGED 3-7 YEARS IN TAGUMPAY, RIZAL USING PERIANAL SWAB METHOD E-ISSN 2229-4686 ■ ISSN 2231-4172 International Refereed Research Journal ■ www.researchersworld.com ■ Vol.– IV, Issue – 2, April 2013 [57]
31. Marquardt W, Demaree R, Grieve R. Parasitology and Vector Biology, 2000. Academic Press, San Diego, CA.
32. Memon, I., Komal Moorpani², Shafiq-ur-Rehman³ **Unusual Histopathological Findings of Appendectomy Specimens** *Pakistan Journal of Medicine and Dentistry* 2014, Vol. 3 (03):
33. Neva FA, Brown HW. Basic clinical parasitology. 6th ed. Norwalk, Conn.: Appleton & Lange, 1994
34. Nithikathkul C, B Changsap², S Wannapinyosheep², C Poister³ and P Boontan ² THE PREVALENCE OF *ENTEROBIUS VERMICULARIS* AMONG PRIMARY SCHOOL STUDENTS IN SAMUT PRAKAN PROVINCE, THAILAND Vol 32 (Suppl 2) 2001
35. Noor-Un-Nisa, W.K. and Khan, A., 2014. A Case of Fasciola hepatica Infection in Swat Pakistan. *Pakistan Journal of Zoology*, 46(6)
36. Nourozian MB, Youssefi MR. Prevalence of Enterobius vermicularis in Babol Medical School, 2011. *World Applied Sciences Journal*. 2012;19(5):634-6.
37. Peterson LR, Bailey WR, Scott EG, Finegold SM, Baron EJ. Diagnostic microbiology: Mosby; 1994.
38. Rahman, H.U., Khan, W., Mehmood, S.A., Ahmed, S., Yasmin, S., Ahmad, W., Haq, Z.U., Shah, M.I.A., Khan, R., Ahmad, U. and Khan, A.A., 2021. Prevalence of cestodes infection among school children of urban parts of Lower Dir district, Pakistan. *Brazilian Journal of Biology*, 82.
39. Rahman, H.U., Khatoon, N., Arshad, S., Masood, Z., Ahmad, B., Khan, W., Rafiq, N., Khan, M.I., Kabir, M., Haq, Z.U. and Kamal, I., 2022. Prevalence of intestinal nematodes infection in school children of urban areas of district Lower Dir, Pakistan. *Brazilian Journal of Biology*, 82.
40. Ramana, K., 2012. Intestinal parasitic infections: An overview. *Annals of Tropical Medicine and Public Health*, 5(4), p.279.
41. Rosenthal PJ. Chapter 53. Clinical Pharmacology of the Antihelminthic Drugs. In: Katzung BG, Masters SB, Trevor AJ, eds. *Basic & Clinical Pharmacology*. 12th ed. New York: McGraw-Hill; 2012. <http://www.accessmedicine.com/content.aspx?aID=55830906>. Accessed December 26, 2012.
42. Sayyari, A.A., F. Imanzadeh,¹ S.A. Bagheri Yazdi,² H. Karami ¹ and M. Yaghoobi ³ **Prevalence of intestinal parasitic infections in the Islamic Republic of Iran** *Eastern Mediterranean Health Journal*, Vol. 11, No. 3, 2005
43. Stephenson LS, Latham MC, Ottesen EA, Malnutrition and Parasitic helminth infections. *Parasitology* 2000; 121 suppl : S 23-38.
44. Still, G.F., *Oxyuris vermicularis* in children *Br Med J* 1899 1. 898-900 <http://dx.doi.org/10.1136/BMG.1.1998.898>

45. Subhan, F., Khan, W., Rahman, H.U., Ahmed, S., Mehmood, S.A., Garedaghi, Y. and Fadladdin, Y.A.J., 2023. Prevalence of Intestinal Parasitic Infection Among School Children of Bajawar, Pakistan. *Int J Med Parasitol Epidemiol Sci* Volume, 4(1), p.20.
46. Wali, K. and Aly, K., 2011. An investigation on incidence of intestinal parasites in under and above 15 years age in farmers of SWAT, Pakistan. *Proceedings of Parasitology*, (52), pp.43-53.
47. Wali, K.H.A.N., Iqbal, M. and Omer, D.A.D., 2020. Have we forgotten the threat posed by fascioliasis? A potential threat to public health. *Iranian Journal of Public Health*, 49(4), p.814.
48. Wali, K.H.A.N., Khan, N.I., Bukhari, S.N.F. and Begum, N., 2019a. Prevalence of intestinal parasitic infection among drug addicts in District Swat, Khyber Pakhtunkhwa, Pakistan. *Iranian journal of parasitology*, 14(2), pp.359-361
49. World Health Organization. Soil-transmitted helminthiasis. Number of children treated 2007–2008: update on the 2010 global target. *Wily Epidemiol. Rec.* 2010; 85: 141–148.