



Short Communication

Albendazole in the Treatment of Ancylostomiasis, Ascariasis, Taeniasis and Amoebiasis in School Children

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ABSTRACT

Present study was aimed to evaluate the efficacies of two brands of albendazole: bendazol and zentel against ancylostomiasis, ascariasis, taeniasis and amoebiasis in school children to make appropriate treatment protocol. All the infected children were randomly divided into 2 groups (A and B). Children in group A were treated with albendazole (bendazol) 400mg/kg while children in group B were treated with albendazole (zentel) 200mg/kg orally once a time. Eggs per gram of faeces were counted in each group before and after treatment. The % efficacy of albendazole (bendazol) and albendazole (zentel) against ancylostomiasis, ascariasis, taeniasis and amoebiasis were reported 92 and 83, 83 and 96, 74 and 81 and 84 and 74%, respectively. EPG counts amongst children in both the groups before and after treatment was not significant ($P>0.05$). Present study was concluded that albendazole (bendazol) was showing high rate of efficacy for ancylostomiasis and amoebiasis while albendazole (zentel) was most effective for ascariasis and taeniasis. Therefore both of the drugs used are equally contributed in the controlling of intestinal parasitic diseases in children.

Article Information

Received 11 July 2018

Revised 12 December 2018

Accepted 19 January 2019

Available online 30 May 2019

Authors' Contributions

WK conceived, designed and wrote the manuscript. MI and IK performed the study.

Key words

Albendazole, School children, Intestinal parasitic infection, Egg per gram, Drugs administration.

Intestinal parasitic infections (IPIs) are one of the major health problems in the world. It is estimated that over two billion people are infected with intestinal pathogenic parasites and five billion live in areas where intestinal parasites are endemic (Hotez *et al.*, 2003). Mass treatment of IPIs in developing countries, is highly endemic and has been reported to be highly effective (WHO, 1981). Chemotherapeutic practices are usually effective where other involvements, *e.g.* health education, the improvement of environmental sanitation, the provision of clean water supply and nutritional supplements, are not available (Hayashi, 1981).

Mebendazole, albendazole and triclabendazole have a wide range of effectiveness against helminth infections. These drugs have been licensed in different parts of the globe for human use (Horton, 2000). Albendazole, mebendazole, as well as pyrantel pamoate and levamisole are recommended drugs against infection with soil transmitted helminths (Albonico *et al.*, 1999; WHO, 2010). Albendazole and mebendazole is known to be effective

for the treatment of *Ascaris lumbricoides* (Adugna *et al.*, 2007) in human from Africa and southern America (Diawara *et al.*, 2009; Cezar *et al.*, 2010). Albendazole has been administered in animal models as well as in human beings for the treatment of helminth parasitic diseases. Albendazole is effective remedy against the helminths parasitic diseases caused by eggs and larvae of various helminth parasites (Cline *et al.*, 1984).

Diseases caused by tapeworms remain a public health problem in low and middle-income countries including Pakistan (Khan *et al.*, 2018). Amoebiasis results in considerable gastrointestinal morbidity, malnutrition and mortality, particularly among children in developing countries (Feng and Xiao, 2011). A number of drugs are used to treat intestinal protozoa infections. Most commonly used are nitroimidazole including metronidazole, tinidazole, ornidazole and secnidazole (Escobedo *et al.*, 2009). Nitazoxanide and albendazole are the alternative effective agents (Ortiz *et al.*, 2001; Yereli *et al.*, 2004). Metronidazole is low in toxicity and is effective against both extra-intestinal and colonic infections (Robert and Janovy, 2008). It is the drug commonly used and recommended in the treatment of amoebiasis (Barwari, 2006). IPIs are usually treated with different drugs, therefore a continued follow up is needed. To the

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0030-9923/2019/0004-1587 \$ 9.00/0

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best of our knowledge no work has been published on the treatment of intestinal parasitic infection through synthetic drugs in Pakistan. This study is aimed to determine the efficacies of two brands of albendazole on the treatment of ancylostomiasis, ascariasis, taeniasis and amoebiasis in children of school at University of Malakand, Pakistan.

Materials and methods

All the infected school children (6-15 year of age) from Public School, University of Malakand, KPK, Pakistan were included in this study. These children had no history of prior use of antihelminthic drugs. All the children were instructed to maintain the clinical supervision throughout the period of the experiment. This study is approved from Ethical Review Committee, University of Malakand in collaboration with District Headquarter Hospital Timergara, Dir Lower, Pakistan.

All the school children, infected with intestinal parasites, selected on the basis of microscopic detection of egg per gram (EPG) of faeces. All the children were randomly divided into 2 groups - A and B. The students in Group A were treated with albendazole (bendazol) systematic (International Union of Pure and Applied Chemistry) (GlaxoSmithKline, Pakistan), 400 mg and students in group B were treated with albendazole (zental) 200mg (Reg. No. Q/12/75, Glaxosmithkline South Africa (Pvt.) Ltd.) orally as a single dose/kg once a time. EPG were calculated by the McMaster techniques given by (Jarvie *et al.*, 2005) prior and after the treatment. The % efficacies at 95% C.I. of the drugs were measured by the formula given by Thrusfield (2005) as:

$$\text{Efficacy of drug tr. (\%)} = \frac{\text{Mean pre-tr. EPG} - \text{Mean post-tr. EPG}}{\text{Mean pre-tr. EPG}} \times 100$$

Where, tr. is treatment.

The data was analyzed by Graph Pad version-5. P value < 0.05 was considered significant statistically.

Results and discussion

Efficacy of the drugs prescribed was noted via the counting of eggs in per gram of the stool before and after treatment (Table I). Percent high egg negative rate

(ENR) was noted for albendazole (bendazol) against ancylostomiasis and amoebiasis and albendazole (zental) against ascariasis and taeniasis. Using the per-protocol analysis, albendazole (bendazol) attained 92, 83, 74 and 84% ENR, although single doses of albendazole (zental) resulted 83, 96, 81 and 74% of ENR (Table II). Comparing the treatment outcomes using the chi square test revealed that albendazole (bendazol) was more effective on infections with ancylostomiasis and amoebiasis than albendazole (zental) and albendazole (zental) was found more effective for ascariasis and taeniasis than albendazole (bendazol). No adverse effect was observed except for albendazole (bendazol) a case resulted gastrointestinal trouble, vomiting and diarrhea, cured with analgesic prescription by the physician.

Number of eggs before treatment was 16000 and after treatment was counted as 1856 for *A. duodenale* (Table II). Findings of the present study agreed with the study conducted by Khan *et al.* (2018) who reported 83% and 75% efficacies, respectively after administration of albendazole (bendazol) 400mg/kg and albendazole (zental) 200mg/kg against hymenolepiasis. Findings of present study were also comparable to that of Steinmann *et al.* (2011) showing 92-95% efficacy against *Ancylostoma duodenale* infestation. Studies conducted in Brazil, Cambodia, Cameroon, Ethiopia, India, Tanzania and Vietnam claimed 88.5%, 87.4%, 87.1%, 98.9%, 74.7%, 86.8% and 100% efficacy of albendazole, respectively (Vercruyse *et al.*, 2011).

Present study reveals 83% and 96% efficacy of Albendazole (400mg/kg) and albendazole (200mg/kg) against ascariasis. Findings of the present study do not agreed with the study conducted by Khan *et al.* (2018), who reported high efficacy of zental against ascariasis than bendazol. In a study conducted by Speich *et al.* (2012), oral administration of albendazole showed 100% cure against *A. lumbricoides* infection, while in present trial this rate was 83% against ascariasis. Regarding ENR the results of the current trial agree with those reported by Rahman (1996) who showed above 90% in relation to mebendazole and albendazole for *A. lumbricoides*.

Table I.- Number of eggs counted per gram (NEPG) before and after treatment for intestinal parasites in school children, University of Malakand, Lower Dir, Pakistan.

Parasite	Albendazole (400mg/kg)		% efficacy	Albendazole (200mg/kg)		% efficacy
	NEPG before treatment	NEPG after treatment		NEPG before treatment	NEPG after treatment	
<i>Ancylostoma duodenale</i>	9600	768	92	6400	1088	83
<i>Ascaris lumbricoides</i>	3900	663	83	3120	125	96
<i>Taenia saginata</i>	3250	845	74	2500	475	81
<i>Entamoeba histolytica</i>	1080	173	84	720	188	74

Table II.- Total number of eggs in present in both groups before and after treatment among subjects positive for intestinal parasites in school children, University of Malakand, Lower Dir, Pakistan.

Parasite	No. of eggs of both groups before treatment	No. of eggs becoming negative	Egg remaining (%)	P-value
<i>Ancylostoma duodenale</i>	16000	8832+5312=14144	11.67	P<0.05
<i>Ascaris lumbricoides</i>	7020	3237+2995=6228	11.28	P<0.05
<i>Taenia saginata</i>	5750	845+475=1320	22.96	P<0.05
<i>Entamoeba histolytica</i>	1800	173+188=361	20.24	P<0.05

Present study demonstrated that 5750 eggs before treatment were reduced to 1320 eggs after treatment were noted for *T. saginata*, respectively (Table II). Findings of the present study were different from that of Khan *et al.* (2018), who reported that the administration of albendazole (400mg/kg) and albendazole (200mg/kg) against hymenolepiasis revealed 83% and 75% efficacies, respectively. Hamid *et al.* (2005) reported that the administration of 10-20mg of Parazequantal show 90% efficacy against the beef tapeworm. In a study conducted by Ahmed *et al.* (1986) albendazole showed 100% efficacy against taeniasis. In other research (Misra *et al.*, 1984) show 57-70% efficacy of albendazole against taeniasis. The albendazole was 100% effective in taeniasis in children when administered for 3 consecutive days (Ahmed *et al.*, 1986). The study conducted by Misra *et al.* (1984) showed that a single dose of albendazole (400mg) was effective 57% to 70% against taeniasis while the same dose for 3 consecutive days increased the success rate to 100 %. Similarly, single dose (10-20mg) of parazequantel revealed 90% efficacy against the beef tapeworm infection (Hamid *et al.*, 2005).

Present study showed reduction of *E. histolytica* eggs from 1800 to 361 (Table II) after treatment with albendazole (bendazol) (400mg/kg) and albendazole (zental) (200mg/kg) which show 84 and 74% efficacy against amoebiasis. These results are in agreement with that of Khan *et al.* (2018), who reported 83% and 75% efficacies, respectively after administration of albendazole (400mg/kg) and albendazole (200mg/kg) against Hymenolepiasis. Metronidazole is the drug of choice for treatment of invasive amoebiasis. Iodoquinol, paromomycin, and diloxanide furoate are the current recommended drugs for the treatment of noninvasive amoebiasis. Iodoquinol is given orally three times a day for 20 days. Nausea, vomiting, diarrhea, and abdominal pain are the associated side effects. Paromomycin is given orally three times a day for 7 days. Diloxanide furoate is given three times a day for 10 days. Side effects include gastrointestinal symptoms, such as nausea, vomiting, and flatulence (Li and Stanly, 1996; Huges and Petri, 2000).

Conclusions

Albendazole (bendazol) appear to be well-tolerated and effective drug in the treatment of ancylostomiasis and amoebiasis while Albendazole (zental) represents more effectiveness against ascariasis and taeniasis in school children.

Acknowledgments

This research is facilitated under the research project (SRGP #21-61) granted by higher education commission, Islamabad, Pakistan.

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